The Builder.

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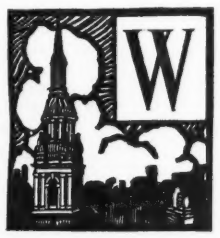
The Dangers of Building.



WE have often thought, in reference to the contemporary accounts of the building of St. Sophia and of the dome which is said to have been built for the most part without scaffolding, how many lives St. Sophia cost. The tale would probably be rather a heavy one, in an age when human life was much less thought of, and under the rule of a building potentate who was one of the most masterful and unscrupulous of men. And probably most of the mediæval cathedrals had their chapter of fatal accidents, in spite of their slow and deliberate erection. Building on a large scale must at all times be inseparable from an element of danger; to erect the permanent structure men have to depend on temporary and comparatively frail structures to work on, which almost inevitably offer traps to the unwary. And the unwary are with us always; the very habitude of working on high places and on narrow and sometimes insecure footing begets indifference to danger; so much so that a strong element in the evidence given before the Departmental Committee on the dangers of building operations is the testimony of employers as to the difficulty of getting workmen to exercise ordinary care for their own safety.

We printed last week the recommendations of the Committee. The evidence upon which they are founded is very voluminous and in some points rather contradictory, and it would be impossible to attempt in an article to survey it all. But it resolves itself into certain leading subjects: the principle on which scaffolding may be planned; the minor details which require attention in order to minimise the risk of the workers, and the degree of attention which should be given by employers to the safety of their men, and of the men to their own safety; the condition of the plant employed in making scaffolding; and the question of official supervision.

The Report is essentially (whether intentionally or not) a Report in the working-man's interests; perhaps unavoidably so. Accidents on buildings seem rather to have increased lately, for which we think one very obvious reason is the increased speed at which most buildings are carried out now: but other reasons are suggested in the evidence, one of which is very significant; it is stated in the evidence of Mr. Bullen, once a workman, now a contractor on his own account:—

> "I would welcome anything that would assist in bringing home to the workman his share of the responsibility. The tendency to-day seems to be to lessen rather than to increase that. As a workman for about eight years and as an employer for about fifteen years I have been much struck with the general and almost absolute disregard by the workman of his personal safety and means to that end. This has been much accentuated since the coming into force of the Workmen's Compensation Act of 1897, and I confidently look to its being still more so after July 1 next, when the Act of 1906 becomes operative."

We read in a French novel not long since the attribution of just the same spirit to the French artisan; a man who had met with a scaffold accident being congratulated by his comrades on his good luck, in view of the compensation to be derived. Mr. Smethurst, another ex-workman and present contractor, without attributing this motive, comments as strongly on the factor of carelessness:—

> "I think many of the accidents which happen are caused by acts of carelessness, and I have a very profound conviction myself, that if it were possible for something to be done to impress upon the workmen the necessity for prudence and precaution on their part it would tend to lessen the number of accidents. I find almost invariably that accidents arise from the contempt that men have for the dangers that are near."

Nevertheless, in the main this is a Report based on a conviction that accidents on buildings are on the increase, and the evidence was taken mainly with the object of discovering how they might be diminished; but some at least of the evidence given by working-men, or the representatives of working-men's unions, shows an only too obvious spirit of hostility and exaggeration as against the contractor. The assertion of Mr. Davenport, the Secretary of the Building Trades Committee of the London Labourers' Council, that there is *no* "better class of builders"—all were "endeavouring to get work done as cheaply as possible with as little plant as possible," is to our knowledge, in some cases at all events, as untrue as it is ungracious; and when the same witness calls on the Government "to attempt to take some care of working-men's lives," one might reply, in view of some other portions of the evidence, that they should set the example by taking some reasonable care of their own safety. But this element

of careless indifference is nothing new. "Wait till I make it safe, Sir," was a speech addressed to the present writer many years ago, when about to go up a ladder which the worthy man had been going up and down himself all the morning. It is a natural human weakness to contemn a danger that you are familiar with, and it is not peculiar to the building trade. But it is hardly fair that workmen or their representatives should call on the contractor to take more pains for their safety than they will take themselves.

The scaffolding is the principal subject of the enquiry, and the principal element in the temporary erections for building; and the dangers in connexion with scaffolding may be divided into two heads—that to men on the scaffold, by falls from it; that to men below, by materials falling from the scaffold. Accordingly it is natural to find that the first witness examined, Mr. Burchall (Manchester), was one who had special experience in the erection of scaffolds. His evidence concerns the outside pole scaffolding we are familiar with in London; as we shall see, there are very different devices employed in some other parts of the kingdom. Almost the first point brought forward in the evidence is the necessity of having the materials sound to begin with; and Mr. Burchall speaks strongly on the necessity of testing poles and ropes before using them on a new job. The poles he would test by placing on them a strain greater than they will have to bear in use—they cannot be adequately judged of by mere inspection. The ropes, on the other hand, he thinks (and with reason) can be sufficiently tested by examination; "you can always see if a rope is in good condition: if the strands have started to give out it should not be used." On this head we may put the question whether roping the ledgers to the standards, almost universal as it is in this class of scaffold, is not a rather antiquated and clumsy method. It has the advantage of being easy and expeditious, and rope is not heavy gear to carry about. We have mentioned and illustrated more than one device of specially designed clasping irons and chains for scaffolding; they do not seem to have come into use much, probably because they require a little more trouble in fixing and make heavier material for transport. But there is the alternative of wire rope, which we are informed has been used with much success, and has the advantage of lasting longer and of not requiring wedging; and it must be remembered that in the case of hemp rope the mere act of wedging is likely to injure the rope at the point where the wedge is applied. And in respect of the poles and ropes we find a complaint cropping up in the evidence of several witnesses (whether justifiably or not we cannot say), that plant of this kind which has been used on one job is not unfrequently, at the completion of one building, carted direct away for use on another, without any intermediate examination. This is certainly a serious charge, though we do not think it is likely to be the case with builders of the highest class.

Then there is the question of safe access to the scaffold, in regard to which several witnesses urge the obvious importance of having a ladder finishing well above the scaffold level, which one would have thought too self-evident to require mention; the master builders who give evidence are as decisive on this point as the men. There is a good deal of contradictory evidence in regard to the danger of splicing ladders, which seems exaggerated; it is almost unavoidable at times, and if it is carefully done, so that the rungs of the two ladders coincide, it can hardly be called dangerous, as some at least of the witnesses admit. Having got your man safely on to the scaffold, there is the provision for keeping him safe there to be considered, and we agree with the majority of the witnesses that there should always be a solidly fixed rail about 3 ft. 6 in. above the scaffold level; not only to give confidence to the men—and though most builders' workmen have long got past being nervous, there may always be a weak head among them—but to provide a reliable support in the case of an accidental stumble. Rope barriers do not serve the purpose; they cannot be depended on to keep tight, and may give when grasped even when they look tight; this also is a point touched on in the evidence. But the rail is not sufficient; safety against falls or slips requires also a plank on edge rising from the scaffold level; some careful builders fix two or three planks, which is all the better, though not perhaps an absolute necessity. This matter of planking at the edge is also, of course, most important in preventing the other class of scaffold accidents, those which may arise from the fall of materials, to the injury of men working below. Indeed, a very large proportion of the serious injuries to men, mentioned specifically in the evidence, seem to have arisen from this cause.

Several witnesses were asked at what height they would consider this careful protection of the scaffold to become necessary; some consider, not till the scaffold got up to about 20 ft. from the ground; others maintained that a scaffold 10 ft. high required the same protection. The objection urged against this seems to be that it interferes with the otherwise easy passing up of material on to a 10-ft. high scaffold; but the evidence is in favour of the protection of a scaffold at this height. Men, as was shown, have been killed, or most seriously injured, by a fall from a 10-ft. scaffold; and it is not, as one witness seemed to think, a mere question of increased nervousness requiring increased protection at a greater height; with practised hands no such nervousness, as a rule, exists; it is a question of accidental slipping or stumbling, which may have as serious consequences at ten feet height as at twenty. And then we come to the question of the planking of the scaffold, and here we are rather surprised to find that a good many witnesses prefer the overlapping of the plank ends to making a level surface by butting them. Mr. Burchall, the first witness, supports this plan, and he states that in Lancashire they use 3-in. planks, a weighty scantling which in itself is all in favour of safety. Then he was naturally asked, when these overlap, "Then one would be 3 in. higher than the other, and would be a stumbling-block to the men?" and we do not think his answer, "It is not a stumbling-block, because the men know of it, and they naturally step up," quite meets the case. A man in a hurry about something may forget. Mr. Thatcher, who is an experienced Factory Inspector, thinks that "butted boards are safer, provided they do not overlap too much," and we are inclined to agree with him. No doubt the overlapping boards are more readily arranged, but it is not either so convenient or so workmanlike an arrangement.

There is a general consensus, among the witnesses examined on this point, that when a new story of scaffold is laid, the one just quitted, below it, should not be immediately stripped of its planking. To have another floor, as it were, underneath, at least minimises the danger from an accidental fall of a plank from the higher scaffold, perhaps bringing a man with it. It is not well to leave a scaffold at a great height with only empty space under it.

The scaffolding for slaters is a separate problem, on which two members of the Operative Slaters' Society gave evidence. The real danger is on a roof with eaves gutters; on a roof between parapets there is little or none. The two points which we gather from their evidence are—first, that they do not approve the system of bracketed scaffolding supported by "iron dogs" driven into the roof (into the rafters we suppose is meant), and consider that roof scaffolds should be secured by ropes suspended from the ridge; a much safer method as long as the ropes are honest. Second, that there should be some scaffold just below the eaves for a man to bring up on in case of his falling and slipping over the eaves. Indeed, one can hardly imagine a more hazardous position than to be doing slating work on a roof of steep pitch with nothing to stop a slip but the eaves gutter, over which a man would almost certainly slide except by very great good luck. We may quote an answer of Mr. Wilson, of the Operative Slaters' Society, on this point:—

> "One great danger is the fact that on a very large percentage of buildings, before the slater commences his work, the scaffolding, which has been used by the bricklayers and other workmen, is partly taken down. That is one of the greatest dangers we have to face. You see, as a practical slater, I can illustrate what I mean. We go to a job where there is scaffolding about 4 ft. 6 in. below the eaves, that is if the whole of the scaffolding is left. The slater can put a trestle on, and with a couple of planks across, so step on to the roof. Very often, however, only a couple of battens are left, and then he has to get a short ladder and place it with one rung across a putlog, and so be able to get up to the spout, which is dangerous as it tends to push the scaffolding out. A regulation that the scaffolding should not be removed until the slater has completed his work would be a great safeguard in that respect."

A good many witnesses gave evidence in regard to what are called "runs," *i.e.*, planks, horizontal or sloping, the latter more especially, for wheeling barrows on. Objection is made by (we think) all of them to single-plank runs, and rightly; although numbers of men will wheel barrows along them with the greatest ease and confidence, they are not safe against an accidental slip; and we must also commend the common sense of one witness who upholds that runs should be of at least three planks, or even five, but

always an uneven number, for the very obvious reason that the barrow is naturally wheeled as near the middle as possible, and on a two-plank run the wheel comes on the line of division between the two planks. The centre of the run should be the centre line of a plank. With runs of at least three planks we doubt whether a fence-rail, demanded by some witnesses, is a necessity; indeed, on anything narrower than a five-plank run the uprights carrying the rail would be liable to be in the way of the barrow, and be a source of danger rather than otherwise.

The method of inside scaffolding apparently in common use in Scotland is something entirely different from what we are used to here, and certainly should be very safe at most stages of the building, if rather cumbersome. It is thus described by Mr. Simon Slater, an Edinburgh contractor. Having premised that the trestles carrying the scaffolding are placed at right angles to, and inside, the walls of a building, he continues :—

"If the scaffold required is a long one and to be used for heavy materials, it is usual to proceed thus:—Three trestles are placed in position at 6-ft. centres, suitable for planks 15 ft. long; this gives a projection over the end trestles of 1 ft. 6 in. This forms one entire section of the proposed scaffold, a space of 12 ft. is here left meanwhile. From this point another complete section similar to the last is erected. The space between these two sections is now filled in by the introduction of a 5-ft. trestle at its centre, and adjusted to the proper level by cross planks placed underneath. On the top of this battens or planks 6½ in. by 2½ in. are laid, the length being 14 ft. or 15 ft. This secures an overlap of from 1 ft. to 1 ft. 6 in. over the existing trestles already described. If a scaffold is wanted, say, 9 ft. high, a second tier of trestles, each 3 ft. by 2 ft. 6 in. by 3 ft. high, is placed upon the planks of the lower scaffold at right angles to the wall, and upon these smaller trestles planks 6½ in. by 2½ in. are placed in a similar position to those upon which the upper tier of trestles rests. In order to keep the planks of these scaffolds in position, it is usual to fix the inside one, *i.e.*, the one nearest the wall, by nailing it to the trestles upon which it rests. The outside plank, or the one furthest from the wall, is similarly nailed, with the result that the intervening planks are held closely in position and a firm scaffold thus obtained.—Is it the practice to nail these planks on both platforms?—Yes."

This is the procedure up to one floor height, when, after the joists are in, planks 6½ in. by 2½ in. are laid across the joists, next the wall line, the inner and outer planks nailed (as with those on the trestles), and this is the foundation for the next trestle scaffold. Thus this is a system of scaffolding re-erected on each floor, for each story. It is, as we said, very safe at most stages of the building, the exception is at the point where the wall height coincides with the scaffold height, and the workman has to lean over to set the outer courses. In this case he is probably not so near the wall as he would be with the outside pole scaffold; and moreover he has no guard-rail behind him. This objection is not made in the evidence, but it is to be borne in mind. However, as observed, this is a safe though somewhat cumbersome method, involving the constant moving and raising of heavy material. On the other hand, the Scottish "bracket" scaffolds for pointing or carving after the walls are up, described by the same witness, appear to be, to judge from his description (which we have not space to quote); extremely dangerous.

The special dangers attendant on the new method of steel frame building are the subject of the evidence given by Mr. F. W. Nicholson, constructional superintendent to the Waring-White Building Company. In this class of buildings a very large proportion of the attendant danger appears to consist in the probability of things such as bolts, rivets, etc., falling on men below. We gather that a good deal of trouble is taken to minimise this, by having floors temporarily boarded over as near up as possible to the level where work is going on; the steel work of course always has to be in advance (vertically) of the masonry. But the replies of this witness in regard to protection of the men on scaffolds are most unsatisfactory, and have too much American *laissez faire* about them. He says that a rope is sometimes put as a guard, but he adds somewhat contemptuously that a man used to the building business ought to be able to work on that scaffold (four boards wide) "without anything to prevent him from falling overboard":—

"But when a man is busy at his work he might step backwards and fall over. The scaffold is only four boards wide?—Well, that is a good width for him to step back, and then there are the boards to save him from falling."

That is exactly what the low boards would not do; they would be more likely to trip him over, and it is admitted that the slender protection of the rope is not always there (we should surmise that it was not very often there). The question is not about what a man ought to be able to do, but about accidental slips or accidents on a narrow and imperfectly protected platform. There is a tone of cynical indifference about this witness's replies on the subject which reminds us too much of the spirit in which dangerous bridges or trestle viaducts are avowedly made on American railways, the consideration being not the safety of the passengers but the cheapest way of carrying rails over a chasm—this is called "the railway point of view." And his reply that a rope is preferable to a guard-rail because "there is more elasticity in it" is simply foolish; that is exactly the reason why it is not preferable.

We may mention a few other points which we noted in this voluminous mass of evidence, which it has indeed been no light task to assimilate. One witness draws attention to the necessity of properly strutting and bracing the framework for the support of a crane, giving an instance where a crane of 5-ton capacity nearly collapsed in lifting a 3-ton girder, owing to the main leg of the framework giving way for want of sufficient strutting. A most odd source of danger in connexion with a crane is mentioned by one witness; the man fixing the rails for it round a curvature, having been apparently used to railway work, actually laid the outer rail of the curve higher than the other, according to railway practice, thereby throwing the crane out of perpendicular. The same witness who mentioned the collapse of the 5-ton crane expresses the opinion that the men working on the new-fashioned steel-frame buildings "run a great risk," as we should expect. "They get as much scaffolding as they possibly can, but if they cannot get poles, they have to do the best they can without"; and he expresses the opinion that "they should be compelled to have a proper scaffolding erected on the outside."

Some of the statements of the labour witnesses seem very much exaggerated; *ex. gr.* the statement that "as a rule nine out of twelve putlogs are loose." Mr. Jessup, of the Amalgamated Society of Carpenters and Joiners (one of the Committee), adds, "I believe the witness is correct in saying that." We must say that we do not believe it, and we observe that another witness says the same. The evidence of Mr. Sidney Stott, of Oldham, an architect whose special practice lies in mill building, is of considerable interest and very sensible. Among other things, he would be glad to see a building regulation that the floors of these mills should be put in as the building goes up, so as not to leave them a great well from top to bottom while the men are at work on the walls. As he justly says, it steadies the building, besides being safer for the workmen. He also insists on butt joints for barrow runs, remarking that "it only needs an extra putlog." Is it in part to save that "extra putlog" that some of the witnesses object to butt jointing on scaffolds? One witness mentions the falling of bricks from scaffolds, owing to the careless way in which they are thrown on, as a very frequent cause of injuries; but this ought to be prevented by an adequate guard-board. We may observe in passing that one of the witnesses, Mr. Flanagan, Secretary of the Federated Builders' Labourers, speaks most strongly against the overlapped planking on scaffolds, and in reply to the question whether the men do not get used to it, replies, "I am afraid some of the men do not. You might remember the step at the lap for twenty times, and the next time you might forget all about it and fall"; which is exactly the common-sense of the matter. Two or three witnesses speak strongly, but not too strongly, as to the folly of "blocking up" scaffolding or ladders on extempore piles of bricks or other materials to hand; but that, we may observe, is essentially a workman's and not a contractor's form of dereliction. A competent clerk of works ought to stop it.

Many more points in the evidence afford matter for comment, but we have not space to go further into them; only remarking that the collected evidence forms a valuable mass of information, more especially as to the manner in which the arrangements for building operations are regarded from the workmen's point of view. They are prejudiced and exaggerated to some extent, but a great deal of what they say is probably true, and at any rate demands looking into; and it is undoubtedly the fact that there are many accidents connected with building which arise from preventable causes. But among those we must also class the probably not inconsiderable proportion which are due to the carelessness of the workmen themselves.

The question as to what system, if any, of official supervision of scaffolds and building plant can be carried out with convenience and efficiency, is a separate one which we may consider in another article.

NOTES.

The Institute of Architects.

WE must congratulate both the Institute and our colonial visitor, Mr. Hurst Seager, on the excellent paper which he read on Monday last on the question of exits from theatres, and the clever and interesting manner in which it was illustrated by diagrams and by his models, with small packages or sacks to represent people and show the actual effect of differently planned exits on the compression of the crowd. Some of his suggestions are open to discussion, no doubt; but there is a great deal in them that is of practical value, and it is something to have a paper which really presents some new ideas and new information on an old subject.

Winchester Cathedral.

AN extraordinary suggestion in the report by Messrs. Weir, Shirley, and Thackeray Turner is that the proportions of 1 : 4 are too rich for concrete used in underpinning work, because the resulting blocks and mortar are too strong! The report goes on to say that better results would be obtained with the weaker proportions of 1 : 6 or 1 : 8, but no argument is advanced in support of the theory that weak material is better than stronger material for supporting loads. A little farther down we read that blue lias lime makes stronger mortar than Portland cement, the fact being that the best hydraulic limes do not possess more than about half the strength of good Portland cement. This time the reporters seem to realise that strength is better than weakness, although displaying lamentable ignorance of the strength of materials. People who write reports containing statements contrary to the dictates of common sense and well-established facts only make themselves ridiculous, and are apt to do mischief by misleading the public.

Winchester Cathedral.

As we expected, we were quite right in speaking with caution of the accusation made by the Society for the Protection of Ancient Buildings as to the employment of the "drag" in refacing the ancient stone-work, as it appears that the drag has never been used at all. Mr. Jackson's letter in reply to the ungraciously worded and absurd charges of the Society, coupled with the letter of Mr. Francis Fox, the consulting engineer, in regard to the Winchester reparations, ought, we should think, to be a lesson to the Society to leave Mr. Jackson alone for the future. The Secretary of the Society however returned to the charge in defence of what he calls "their moderately worded Report," and by way of creating a feeling against Mr. Jackson, rakes up an old complaint against him for having removed the statues on St. Mary's tower at Oxford; statues which were crumbling into fragments in a manner that constituted them a source of actual danger to the public. The Society for the Protection of Ancient Buildings seems to have an unrivalled capacity for making itself disliked and for putting itself in the wrong.

A Light Case.

AN important point was decided by the Court of Appeal in the case of Richardson *v.* Graham (current "Law Reports"). The plaintiff was entitled to a leasehold interest in certain premises which by virtue of the Prescription Act, 1832, had acquired a right to light as against the adjoining premises, the freehold of which was vested in the defendant. On March 5, 1906, the plaintiff issued the writ in the present action. On March 29, 1906, the owner of the freehold of the premises leased to the plaintiff conveyed his reversion in the freehold to the defendant. It was contended that this unity of possession extinguished the easement, and that therefore the plaintiff could recover no damages after the conveyance of the freehold to the defendant. The Court negatived this contention. This decision really follows that recently delivered by the House of Lords in Fear *v.* Morgan (see our "Note," August 10 last). In that case it was decided that the right to light remains in favour of a lessee not only against the adjoining lessee, but against the common landlord and all succeeding owners of the adjoining tenement. It appears that to extinguish the easement there must not only be unity of ownership, but a right to possession, not merely a reversionary interest.

As to Land Compulsorily Acquired.

IN the recent case of An Arbitration between Lucas and the Chesterfield Gas and Water Board, the land being acquired compulsorily under the Lands Clauses Act, 1845, possessed special advantages as a site for a reservoir, but it could not be used for this purpose without an interference with a line of pipes laid by the Gas and Water Board under the provisions of an indenture entered into in 1875. This raised the question whether the adaptability of the land for the special purpose could be regarded in assessing its value, seeing that it could only be used for that purpose by some body who had Parliamentary powers enabling the existing pipes to be interfered with. Mr. Justice Bray decided that the special value of the land had rightly been taken into account by the arbitrator. The onus is laid on the person acquiring the land to show that the special value of the land has no market value. In this case it was endeavoured to be shown that there could be no buyers on the grounds that there was no water, and that if there were the Board could by reason of its existing powers prevent the land being acquired for the particular purpose. The Court negatived both contentions, and, as regards the latter, pointed out that the Board itself might at some future time require to acquire the land to extend its own undertaking.

The City Explosion.

CONSIDERING the stringent regulations which very properly govern the storage of petroleum and inflammable liquids in the Metropolis, it is a little strange that miniature arsenals should be allowed in so populous a district as the City of London. The occupants of business premises are more or less reconciled to the risk of fire, but cannot be expected to view with equanimity the prospect of being blown up by subterranean stores of explosives and exposed to sharp fusillades of rifle bullets, as happened to numerous persons employed in Aldermanbury last week. Of course, it would be a hardship to gun and ammunition makers if they were banished entirely from business quarters, and we do not think that such a measure is necessary providing suitable limits are placed on the quantities of explosive material stored in any one building and adequate safeguards are made compulsory.

Still Another Runaway Tramcar.

GLASGOW is the scene of the latest tramway accident. Series of accidents would be the more correct term, for this Juggernaut car after breaking out of control at the top of High-street first upset a lorry full of lemonade bottles, killed one horse and seriously injured three persons, then after scattering traffic in all directions it smashed into matchwood a second lorry opposite College-street station, and collided with two other lorries at Glasgow Cross. Nine persons in all were seriously hurt, and it is a wonder that the damage done was not more considerable. Something certainly must be done at once to stop these constantly-recurring tramway accidents; if necessary, by stopping all services on steep gradients until brakes have been adopted that are capable of keeping the vehicles under control. If motor-cars and motor-omnibuses were given to similar outbreaks there would be a terrible hullaballoo. Tramcars that run amok are really far more dangerous, and we hope stringent action will be taken without further delay to safeguard the persons and rights of the public from injury and infringement by tramway authorities who, in spite of numerous warnings, continue to abuse the privilege of using the public streets as railway lines.

Teignmouth Pier and Seawall.

OWING to complaints made relative to the removal of sand and shingle from the banks which form a protection to Teignmouth harbour, a Board of Trade inquiry was held in 1898, but it does not seem that the practice was absolutely prohibited as the abstraction of beach material still goes on. The serious injury caused to the pier and sea wall will probably rouse the local authorities and the pier company to further action for the preservation and improvement of the natural defences to their property. By the heavy seas of last week the foundations of the pier and sea wall were denuded, the shore end of the pier collapsed, carrying away the pavilions and various shops built upon it; the wall protecting the lifeboat station was undermined, and so were the foundations of the lighthouse; and part of the public garden was washed away. Perhaps some of this damage might have been done even if no depredations had occurred on the part of those who desire cheap concrete above everything else. That, however, is an additional reason why the accumulation of beach material should be increased rather than diminished at Teignmouth.

The Cost of Electrical Power.

THE paper read by Mr. J. F. C. Snell, on the "Cost of Electrical Power for Industrial Purposes," to the Institution of Electrical Engineers this week, is not only of great value to electricians, but it is also of general interest to the community. The electrician will be interested in the discussion of the maximum area over which it is possible for a supply company to distribute electricity economically, and for the numerous tables of costs, etc., having a direct bearing on this point which the author gives. We agree with Mr. Snell in thinking that those of the London companies which supply electricity for power purposes at less than cost price are ill-advised. The South Metropolitan Company, for instance, charge the consumer only about a penny per unit, although the real charge, if all the customers were treated equitably, ought to be more than double this. The power user is being supplied at the expense of the lighting consumers. Certain London municipalities also penalise their consumers in order that the bill for the electric lighting of the streets may not appear excessive. The low prices charged for power give the public the impression that the existing generating stations in London are capable of meeting the demand, but this is not the case. The only way of dealing with the London problem is to erect a large power station with modern appliances. It would be possible by this means to supply power profitably at a less rate than that at which any of the London companies are giving it away. The author considers that any further expenditure on individual stations in London would be very unwise. In the provinces generating stations in the larger towns should transmit power to sub-stations in the surrounding smaller towns. It will increase the difficulties of small local boroughs to go on adding to the capital cost of their supply stations. It would have been wiser if the controlling authorities—the Board of Trade and the Local Government Board—had prevented many of the smaller local boroughs from adopting separate supply stations. The only remedy for the existing state of affairs is that neighbouring boroughs recognising the limitations of small stations should co-operate to obtain a mutual supply.

The Ironmongers' Company's Almshouses, Shoreditch.

THE Charity Commissioners have agreed to hold a public inquiry in the matter of the proposal of the Ironmongers' Company to sell their almshouses, with chapel and gardens, in Kingsland-road, Shoreditch. The National Trust, the Metropolitan Public Gardens Association, and the Society for the Protection of Ancient Buildings, addressed a joint memorial to the Commissioners, urging them to refuse their sanction to any scheme which involves the destruction of the buildings and the garden, and not to sanction any other scheme without holding a public inquiry. The buildings, which adjoin the almshouses of the Framework Knitters' Company, founded in 1727, possess the historical and architectural interest that attaches to institutions after their kind established during the XVIIth and XVIIIth centuries in that and adjacent parts of east and north-east London, when the localities formed less remote suburbs of the town, and they now remain in a neighbourhood crowded by mean business premises and unattractive warehouses—one of the few extant examples, upon their pristine site, of the charity and benevolence of the citizens of London. The charity was founded by Sir Robert Geffery, or Geffrey, who, in 1703, bequeathed to the Company nearly all of his estate in trust for the purchase of ground for an almshouse to receive as many as the rents and proceeds would support, each inmate being entitled to 6*l.* per annum and 15s. for a gown. The Ironmongers' Company bought a site of about 6,914 sq. yds. between Pearson and Harwar streets, on the east side, south end, of Kingsland-road, and erected fourteen houses and the chapel. A bequest of 3,500*l.* Consols in trust under the will (July, 1846) of William Wild, enabled the Company to augment the pensions: some years ago the estate yielded an annual income of nearly 1,700*l.* The buildings were lately re-roofed, the chapel has been redecorated, the large front garden has some fine trees, and a part of the site, being occupied by a disused burial-ground, could not be used for building purposes.

The New Gallery.

IT seems a fashion now to make an artificial status for art societies by the use of the word "International," only justified by a sprinkling of foreign works, for that (as far at least as the pictures are concerned) is all that there is of the foreign element in the exhibition of the "International Society of Painters, Sculptors, and Gravers," now open at the New Gallery. In the Entrance Hall M. Rodin's headless statue of a man walking strides as it strode last year at the New Salon; a thing of power if it were only finished. But there are some fine things among the sculpture; M. Rodin's portrait bust of Mrs. Hunter; a grand alto-relief by M. Bartholomé, somewhat recalling the "Monument aux Morts," and intended, like it, for Père Lachaise; and a collection of mostly small works by Dalou, including a faun and nymph, "Le Baiser," which is one of the most beautiful little marble groups we have ever seen. Among many crude, ugly, and more or less absurd paintings are to be discerned a fine half-length portrait of Signor Tosti by Mr. Lavery (174); a very fine wild "Border Landscape" (128) by Mr. E. A. Walton; Mr. Oliver Hall's "Albi" (132) and "Bardsea Forest" (126); a view on "Place St. Marc, Venice" (136) in M. Le Sidaner's artificial but effective style; Mr. Charles Shannon's brilliant and clever oil sketch, "A Souvenir of the International Ball" (177)—a much better work than his would-be poetic nudes; two or three powerful landscapes by the late Herbert Goodall (218-220), rather recalling Constable in style; a fine landscape by Mr. Grosvenor Thomas (234); a remarkable ideal work, a nude figure in a warm-toned landscape, "Solitude" (139), by Mr. Strang, whose larger painting, "After Work" (224), looks too much like a cabinet *genre* picture magnified; a portrait of a lady (237) by Signor Mancini, which for the first time leads us to recognise something worth recognition in his peculiar method—the picture seems to *grow* out of an assemblage of indeterminate points of colour; and a very large canvas by Carrière showing the audience in a theatre as they might appear in a London fog. The South Room contains some very good work in black-and-white, overpowered in our recollection by the row of hideous and vulgar studies (!) of modern life figures, by M. Legrand, which represent the very degradation of art. The Society held a reception on Tuesday evening, when some hundred "guests" were present, for whom no refreshments were provided, and who had to pay for their catalogues.

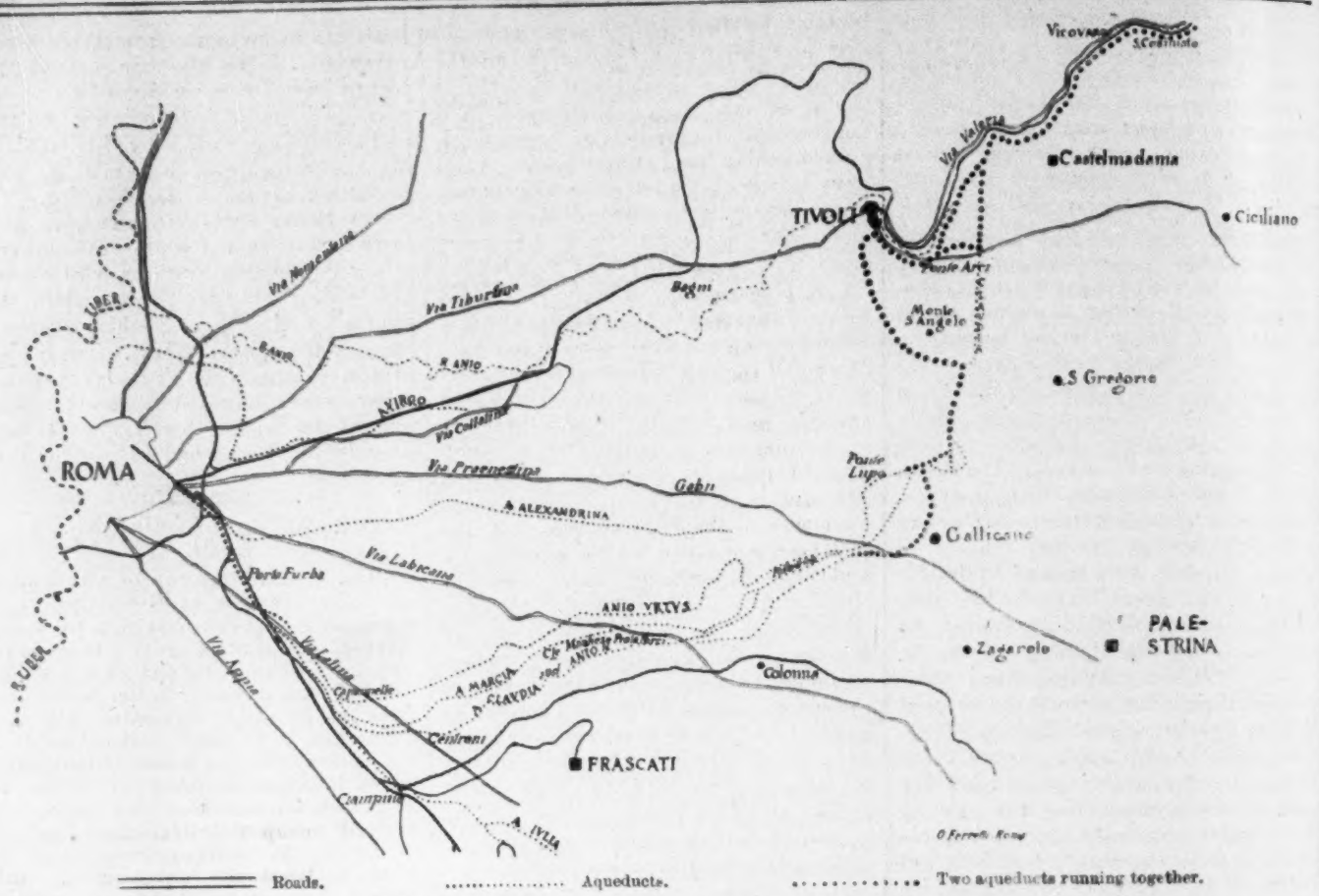
THE AQUEDUCTS OF ANCIENT ROME.—I.

By DR. ASHBY, DIRECTOR OF THE BRITISH SCHOOL AT ROME.

IT is a curious fact that the monuments of the power of Rome in the remotest borders of her empire are in reality better known than those that lie at her very gates. One need not perhaps be surprised if minute details of the topography of the Roman Campagna are left to investigators of the present day, so much more fortunate than their predecessors in the all-important matter of maps—so much so, indeed, that the discoveries of some of the earlier explorers have been forgotten, partly because their descriptions were of necessity vague and not easy to understand, and partly also owing to a failure on the part of XIXth century topographers to recognise the value of the work done by such scholars as Holste and Fabretti in the XVIIth century, and Capmartin de Chaupy in the XVIIIth (cf. *Papers of the British School at Rome*, i. 272 *fin.*; iii. 30).

But that the aqueducts should have shared in the general oblivion is somewhat remarkable. Considering the fame which the arrangements for the water supply of Ancient Rome justly enjoyed—a Greek writer of the Augustan epoch speaks of the aqueducts, the roads, and the drainage system as the most striking of the public works of the city—it is noticeable that they have not formed a subject of study for more recent investigators. Here even the diligence of the XVIIth and XVIIIth century scholars fails us. Canina, in the fifth and sixth volumes of his *Edifizi di Roma Antica*, gives descriptions and drawings of some of the most prominent remains in the Anio valley and in the neighbourhood of Tivoli and Gallicano, and in the third and fourth volumes, of the well-known line of arches in the immediate neighbourhood of Rome; but the only comprehensive work on the subject is Lanciani's *Comentarii di Frontino intorno le acque e gli aquedotti* (*Atti dell' Accademia dei Lincei*, ser. iii., vol. iv. (1880) and separately). This monograph is based upon the treatise on the aqueducts written by Sextus Julius Frontinus, who was *curator* of the whole system under Trajan, and upon much original research, and is by far the best treatise on the subject available; but many problems are still left unsolved. Since this work was written, the construction of railways has rendered further study far easier than it previously was, the remoter parts of the Campagna, hitherto with difficulty accessible, having been brought within easy reach of Rome. But no one seems to have felt the desire of filling up the gaps in our knowledge which still remain, nor of superseding, or even adding to, the available illustrations of the portions of the aqueducts which are already known.

Of the eleven aqueducts of Ancient Rome the four most important are those which come from the valley of the Anio above Tivoli—two of them, the Anio Vetus and Anio Novus, taking the water from the river Anio itself, and the other two, the Marcia and



Sketch Plan of the Course of the Ancient Aqueducts of Rome.

Claudia, from springs which rise in the floor of the river valley. The rest divide themselves topographically into four more groups—the Appia and Virgo, which rise from the low ground between the Via Collatina and the Anio, the Alexandrina, which comes from springs situated to the south-east of Gabii, the Tepula and Iulia, which are taken from the lower northern slopes of the Alban Hills, and the Alsietina and Traiana, which drew their supplies from the district near the lake of Bracciano, on the right bank of the Tiber. The chronological order is, as might be expected, different from the geographical arrangement which I have indicated, new sources of supply being drawn upon as the needs of the population become greater.

The first group is, however, by far the most interesting, as well as the most important. The distance traversed by the shortest of the aqueducts from the Upper Anio valley is three or four times as great as the length of any of the others on the left bank, and the country through which they pass presented far greater obstacles to their engineers. There has been, indeed, a considerable gap in our knowledge of them, their course having been hitherto unknown from Ponte Lupo, near Gallicano, to Le Capannelle, where the long line of arches, so well known to all visitors to Rome, begins. A suggestion was made by Professor Lanciani, that the calcareous deposit which is so abundant in the water, and which was thrown out at the shafts, by means of which the aqueducts were ventilated and could also be entered for cleaning, ought to betray their presence in the volcanic district through which this portion of their course lies. Investigations on the spot were amply rewarded, and I have been able to ascertain the course of each of the four from point to point. A short preliminary account appeared in the *Classical Review*, 1901, 325; and I have since been able to make some further discoveries, though I cannot say that my investigations are yet complete. It would be well worth while, though it would require a considerable expenditure of time, to ascertain the exact level of every single fragment of the aqueducts that is now visible,* and in certain cases it is difficult, if not impossible, to be sure from mere inspection to which of the four a given piece belongs. Illustrations of the remains by photographs, however attractive and picturesque (though without colour it is impossible to do justice to them), do not give a fair idea of the architectural history of some of the massive bridges over which they pass; so that elaborate architectural drawings ought, strictly speaking, to be made of the more important.

And one's researches should be extended to certain of the other aqueducts. Of the Appia but little is to be found, while the course of the Virgo, still in use, is accurately known; the Tepula and Iulia travel, like the Appia, at a low level, and have no difficult country to traverse; and the remains of the Alexandrina are well known and prominent enough. Of the Alsietina, on the other hand, little is known. Lanciani records his inability to find traces of it, and doubts the accuracy of Nibby's account; while, though the course of the Traiana is followed by the modern Acqua Paola, it would seem, from the description that we have of certain of its remains, that it deserves a more careful study than has hitherto been devoted to it.

It is, however, with the four aqueducts of the first group that we shall in the main be occupied.

The earliest of them in point of date is the Anio Vetus, which was constructed forty years after the Appia, in 272-269 B.C. It took its supply from the River Anio, as its name implies, at a point about ten miles above Tivoli, in the gorge of S. Cosimato. The Marcia was the next, though considerably later, in point of date (144 B.C.), and took its origin from springs about thirty-eight miles from Rome, three miles, Frontinus tells us (*De Aquis*, i. 7), to the right of the thirty-sixth mile of the Via Valeria, and 200 paces to the left of the thirty-eighth mile of the Via Sublacensis. Augustus tapped additional springs 800 paces higher up the valley for the Marcia, by which he doubled its volume, though the springs of the Claudia, which was begun in 38 A.D., and completed in 52 A.D.,* were only 100 paces beyond the original source of the Marcia. Attempts have been made by topographers to identify the individual springs; but as Lanciani remarked twenty-five years ago in his monograph, the question, though interesting to the topographer, is of minor importance, and not one in which certainty can be attained. The face of nature has changed considerably since Roman times, the level of the floor of the valley having risen owing to the calcareous deposits of the Anio and of the springs themselves; in fact, the engineers of the modern aqueduct (the Marcia Pia, which uses the same springs) have found the ancient aqueducts at a depth of 7 or 8 metres, and have also discovered that the large pools in which the water rises are merely due to leaks in the ancient collecting channels, the springs themselves being situated under the rocks at the edge of the valley. Considerable modifications have also been caused by the necessary work of enclosing the modern springs so as to preserve them from pollution; so that further study of the problem would be difficult, even if it were worth while.

The Anio Novus dates from the same period as the Claudia, but drew its water originally from the river four miles further up; as, however, the water was apt to be turbid, Trajan carried out a project of Nerva's, according to which the three lakes constructed by Nero for the adornment of his villa above Subiaco were used as filtering tanks for the aqueduct. This increased its length considerably, the distance from Rome to Subiaco being about forty-seven miles by road, whereas the original intake was at the forty-second mile of the Via Sublacensis.

In dealing with the actual remains† of

* Many of the remains do not appear in the Italian staff maps at all, and the scale of these (1:25,000) is too small to allow of accurate determination of levels except in comparatively few cases.

* So the inscription on the Porta Maggiore (*C.I.L.* vi. 1,256); but Tacitus' words (*Ann.* xi. 12) "fontesque aquarum Simbruinis collibus deductos, urbi intulit," may refer to the completion of the Claudia in 47 A.D. (cf. Furneaux *ad loc.*).

† The sketch map (Fig. 1) gives a fair general idea of the course of the aqueducts from Cosimato to Rome. For the details of their course from Tivoli to Rome, I may refer to the maps in *Papers of the British School at Rome*, Vols. i., iii., iv.

these aqueducts, it will be most convenient to divide the description into three parts, the first dealing with their course as long as they remain in the Anio valley; the second with the succeeding tract of country, in which they descend gradually to the level of the Campagna; and the third with the final section, which begins at Capannelle, where all of them (except the Anio Vetus) emerge from their underground course and run on arches right up to the walls of Rome. It will also save one from dealing with the same tract of country many times over if the remains of all the four aqueducts are described together as far as possible. It may be added that both the Anio Vetus and the Marcia shared in the general restoration of the aqueducts under Augustus, and were resurveyed by his engineers, so that both of them had a regular series of inscribed *cippi* bearing his name. These served to mark the ground belonging to the aqueduct and protect it from encroachment, and perhaps sometimes to denote the place where ventilating shafts existed. The Claudia and Anio Novus had no *cippi*, as far as is known.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE fifth general meeting (business) of the session was held on Monday at No. 9, Conduit-street, Regent-street, W., Mr. T. E. Collcutt, President, in the chair. Mr. S. Hurst Seager, of Christchurch, New Zealand, was elected as a Fellow, and Mr. W. Godfrey Green, of London and Acton, as an Associate. Mr. Chas. R. Guy Hall then moved the following resolution:—"That the Council be desired to consider the advisability of holding an examination in honours, and to report to a general meeting," but the motion failed for want of a seconder.

An ordinary meeting was then held.

Safety Exits for Theatres and Other Places of Entertainment.

Mr. S. Hurst Seager then read a paper on this subject, of which the following is an abstract:—

The subject of safe egress from public buildings was one of such paramount importance that he had very readily accepted the opportunity offered him of placing before members for their consideration and criticism a method he had designed for preventing crushing at exits. He had the more confidence in doing this as the method had already been carried out at some of the exits in two New Zealand theatres, with the result that the audience were able to leave that portion of the auditorium to which the method was applied much more freely and quickly than under the ordinary arrangements. Fortunately there had been no panic since the alteration, but the ease with which the audience passed from the auditorium to the street without the slightest tendency to, or even possibility of, crushing confirmed him in the belief (which the study of principles and their application in models had created) that he was justified in calling his method "the safety exit."

Such slaves were we to precedent that building after building was constructed in which were to be seen all the faults in the forming of exits which had led to such heartrending fatalities in the past. To effect any improvement it was principles, not precedents, which must be carefully studied, understood, and followed. No greater error could be committed than to regard the London County Council regulations as all that was required to be followed in order to make places of entertainment safe in times of panic, or even as convenient as possible on ordinary occasions. They merely stated a minimum number and a minimum width of openings; they made no attempt whatever to show how they should be constructed, except in the case of stairs, which he should show was the form which in times of panic would be more likely to lead to disaster than many others. The mode of construction of exits was of infinitely greater importance than their number and widths. Many places of amusement, lecture-halls, and places of worship, though fulfilling the requirements of the Council, would prove to be veritable death-traps in times of panic: a very large proportion of the audience would never be able to reach the exits at all, and a great many more would either be crushed in them or in the corridors or stairs leading to them, and this because the elementary principles which should govern their construction had been ignored. The principles were so extremely simple that they only needed to be clearly stated to at once place in the possession of all a standard of criticism by which every work could be rightly judged.

The problem was so to arrange exits that, without any choice in the matter, perfectly irresponsible people in any portion of the building should be impelled to move towards the one designed for their use, through which they must be able to pass to the street without any danger of resistance either from the structural arrangements or from opposing active forces. This was the fundamental principle to be kept steadily in view as the ideal to be reached as nearly as possible. The author demonstrated by diagrams and models how this principle had been totally neglected in some lately erected buildings, and went on to refer to a dictum of a writer on theatre planning that long straight passages were objectionable, because "a long straight passage, and more a long straight stair, was open to the danger of accumulated pressure." It could be very simply demonstrated, however, that in a straight passage—properly designed—whatever its length, there could not possibly be any pressure at all provided the sides were perfectly smooth, as they should be, and that the passage was of equal width throughout. Moreover, accumulated pressure was not dependent upon the length of a passage at all, but only on its width. This was a most important consideration, which must of necessity have great influence upon the designs of exits. Exits must be free from the danger of resistance, for motion in one direction, or pushing, could not be converted into pressure unless there was something to push against, as projections at the sides of passages, projecting jambs of doorways, walls at a sharp change of direction, or opposing active forces. All these were objects of resistance, against which pressure could be exerted.

The author's safety exit, of which a plan was shown, had for its aim the eliminating of all resistance to outward progress by means of curved solid dwarf partitions, which should be shoulder high, or about 4 ft. 6 in. They might be constructed of double plates of sheet iron, must be permanently and strongly fixed, and be perfectly smooth. A diagram exhibited showed the method of application to an already existing exit. It showed that the exit—if wide enough—would be divided into three parts, the outer ones equal in width to the gangways at the ends of the seats, and the central one proportionate to the number of people using it. By the use of this simple device any pushing would not create any pressure at the exit, but would only tend to hurry the audience more quickly into the street or corridor.

Various other models and diagrams were shown in order to demonstrate the author's plans for the easy progress of people out of the gangways of the theatre, and the application of the safety exit to suit varying circumstances.

The effectiveness of any exit depended solely upon the number of people who could pass through it in a given time; but this appeared to have been wholly disregarded in the greater number of instances, both in England and elsewhere, or the rule would never have been laid down, and apparently generally accepted, that "corridors shall have a minimum width of 4 ft. 6 in. if for the use of not more than four hundred persons; shall be 5 ft. if for the use of five hundred persons, and shall increase in width at the rate of 6 in. for each additional one hundred persons." These widths were shown to be based upon a fallacious principle.

The author was of opinion that, though the new regulations of 1906 demanded infinitely greater security than those which had hitherto been in force, they might still be improved in several important particulars. The retention of the 5-ft. width, although not presenting so serious an element of danger as the 4-ft. 6-in. one, must be regarded as an oversight when one reflected how easily possible it was for three people above the average of three men of average stature to block it by forming a segmental arch across it.

In conclusion, the following points were put forward as showing the direction in which the London County Council regulations should be amended:—

The exits should be based on a unit measurement corresponding with the average width of adults.

All exits should be of even width throughout.

If any increase was made in the width on the line of egress that width should be maintained to the street.

The walls of all corridors should be perfectly smooth to a height of 5 ft.

Every change of direction in the exit should be made by means of curved non-resisting surfaces.

The exit from any part of the building should in all cases be also the entrance.

Every precaution should be taken to keep the exits unimpeded by carriages or people.

Mr. W. Woodward, in proposing a vote of thanks to the reader of the paper, said he entirely agreed that too much importance and too much reliance should not be attached to fire-resisting or fire-proof construction in theatres. If a fire occurred at all the desire of those inside the building was to get out, and the fact of whether the building was of fire-resisting construction did not make any material difference as to possible loss of life. The danger, as they all knew, was panic and the consequences which resulted from people rushing from the different parts of the theatre. The circular passages and ends of corridors which had been described convinced him, and he hoped would also convince the London County Council, that it was very desirable to amend their regulations, at all events with regard to the exit corridors. He agreed that it was a danger to have a corridor either too wide or too narrow, and although the proportions of the human form given by Mr. Seager might not exist in all cases, still he had given a very good average. Another important point was with regard to these so-called crush rooms, which were in themselves an absolute danger. Instead of crush rooms they might more properly be called crushing rooms. If they got through the several exits from the hall or theatre into the crush room there the danger existed, for in cases of excitement crushing would take place, and before the people could get to the exits which Mr. Seager would provide lives would be lost. He agreed that a person leaving a theatre or concert-hall naturally went towards the entrance he came in by, and if instead of the square angles which existed in most theatres they had the curves such as were shown on the drawings he was perfectly sure the danger would be much minimised. They had seen from the models that the multiplication of the corridors need not be unsightly, as the barriers would not be higher than 4 ft. 6 in. He trusted that the London County Council would give some attention to Mr. Seager, who was evidently versed in this question of exits, and if they could have other men coming from the Colonies and giving them additional information on such matters they would only be too pleased to welcome them.

Mr. Hubbard seconded the motion, and said that Mr. Seager had brought forward a scientific truth upon which there could be no discussion. Mr. Seager had showed clearly, and scientifically laid before them, the fact

how a stream of persons could leave a building with least friction, and after examination and explanation of the diagrams and models he did not think any of them would forget the lesson. It was one of the most perfect scientific papers he ever remembered hearing in the room. Mr. Seager had impressed upon them that in times of danger people were apt to lose their heads and do exactly the things they ought not to, and looking to one of the diagrams shown he felt that instead of going round the seats, as indicated, he would feel tempted to jump over the seats and try and get to the nearest exit, and by doing this he would, of course, increase the crush in that particular exit.

Mr. Atkin Berry said that in his imagination he found himself still struggling with the four men in the passage in single file, described by Mr. Seager. Mr. Seager told them that it was only as the pressure of one, but the principles of statics and dynamics must have altered since his schooldays. For he well recollected the unfortunate boy at the end of the bench being called upon to receive the pressure of the other boys, and finding himself on the floor. He could not quite understand how one man could resist the pressure of four others. It also occurred to him that they could not rely upon all the people leaving their seats in the same calm and orderly manner as if there was no fire, and in reference to one of the plans exhibited, if the people jumped over the seats as there arranged, there would be a jam, in addition to that caused by opposing forces meeting.

Mr. Hodges said that he had been for fourteen years a surveyor of theatres and music-halls under the London County Council, and, like other speakers, he thought he would be tempted to jump over the seats instead of going round by the passage. In the diagrams before them Mr. Seager had not shown how he was going to hang the doors and how they would open and close, and there might be a very considerable amount of draught from the various doors and passages. Doors swinging in or out must form some obstruction to people leaving the building. The most important question, however, as regards exit was in relation to the people above furthest away from the street. Exit from the ground level was more or less easy in most modern theatres, and the danger always was with those in the upper parts of the house. There was also the question of automatic bolts, which sometimes were very far from automatic. Often the hole into which the bolt was shot became filled with rubbish, and consequently the bolt would not work and the doors would not open. He had drawn the attention of firemen to this, and they had taken a run and thrown themselves against the doors with all their might, and then had looked triumphantly at him and asked if they were not all right. Of course they wanted automatic bolts to be in such order that they would open at the slightest movement.

Mr. Max Clarke said that Mr. Seager seemed to put fire-resisting construction in the second place, and good exits in the first place, and he did not think that the correct point of view in which to look upon the construction of buildings. Everyone who had ever designed a theatre or music-hall had it in his mind that people wished to get out of it in the most rapid manner, but they also knew that just the things they arranged for the audience to do they would not do in the case of panic. The impression in the public mind was that theatres were not fire-resisting, and they could not persuade them otherwise. He remembered making a drawing and saying at the time, "I will put a window in this particular place, so as to allow men to get out if there is a fire," but two men were burned in that place, and never thought of opening the window. That was his point. The theoretical idea of Mr. Seager was excellent, but if he could show him a complete set of drawings with the arrangement carried out it would be a wonderful revelation, because as a rule in London one had to put a theatre upon a site which was somewhere between 20,000 and 60,000 superfical feet, and if they did not get a certain number of people into the building it would not pay. Again, if they spent more than 60,000*l.* upon it it would not pay, and to carry out all these things and comply also with the London County Council requirements was a very difficult task. He knew the theatre which Mr. Seager had alluded to in which some of the landings were circular and some not, but looking to the diagrams shown he believed the people in case of panic would at once jump over the seats. This was because it was impressed upon the mind of the public that theatres were not fire-resisting. When they made theatres which would not burn, then the people would go out at a leisurely pace, and if they did that they could all get out of any theatre in ten minutes. He was under the impression that if they put six men in a row and gave them a foothold they would exert more force than one man standing at the end (particularly if there was any swaying action). If the surface they stood on was slippery he did not think they would. He was glad to hear of these new developments, because it was only in this way that they could get on, and although the suggestions made appeared to be extravagant in the way of space, yet if they had the space and the money there was no reason why they should not be carried out, and, if so, they would certainly be better than the present arrangements.

Mr. Chisholm suggested that the author might make a clearer definition between a passage and a corridor, having regard to the question of width.

The vote of thanks having been carried,

Mr. Seager said he did not intend for a moment to bring before them details of construction, for there were those present far more fit than himself to carry out any principles which might be enunciated. All he set out to do was to bring before them some principles which, so far as he could see, had not been recognised. Mr. Max Clarke spoke of the knowledge of a building being fire-proof being its safeguard, but they had to remember that the Chicago building was fire-proof in every respect, and that although the fire was a large one there was practically no effect on the structure, and yet there were 70 per cent. of deaths. This was a thoroughly up-to-date modern fire-proof building, and the result of the fire showed that it was so, and yet all these deaths occurred. They could not tell people to sit quiet when a fire started, for they simply rushed to get out. With regard to the criticisms made, the diagrams were rough drawings simply intended to show principles, and he was only in his paper attempting to deal with the dangers which existed in present buildings and to show a method of overcoming them to some extent. The facts presented in one of the diagrams were to be seen in many London theatres, and the next diagram which had been criticised made arrangements for improving the safety of the audience. If, however, he had to start *de novo* he would not adopt the methods shown on the diagram, for he considered the only safe way to be adopted was for everyone in a seat to have the chance of getting straight to the street or into wide corridors. However, he did say that by the methods he had explained they could minimise the dangers which were to be found in the great majority of buildings in London and elsewhere.

Mr. H. H. Statham said he understood that Mr. Seager would make all exits also entrances, but would that not add considerably to the cost of management?

Mr. Seager said it would, of course, necessitate extra staff, but he considered that a few shillings extra per night paid to men would be nothing compared to the safety of the audience. As to the doubts of the truth of his statement that one man could push four, the illustration of Mr. Berry did not apply, because there it was the impact. He would be pleased to hold his own if any gentleman liked to try and push him down.

Mr. Max Clarke asked to be allowed to point out that the Chicago theatre was not finished in many particulars. It had no hydrants or fire-resisting curtain, and it was the fact of the stage paraphernalia catching on fire which frightened the people and caused the panic when they saw the curtain would not come down.

The Chairman announced that the next meeting would be held on January 20, when the awards and prizes to students would be announced, and a paper would be read by Mr. W. T. Oldrieve on the "Royal Palaces of Scotland."

"MILTON'S RETREAT," CHALFONT ST. GILES.

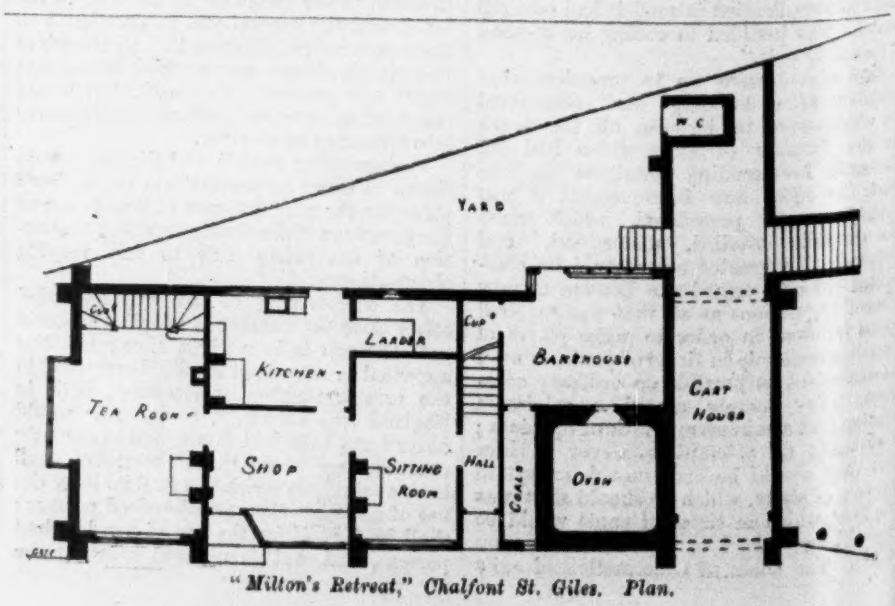
THIS is a small country inn built opposite to Milton's cottage at Chalfont St. Giles, Bucks, chiefly for the accommodation of visitors to the latter; hence the title given to it.

The walls are treated externally with rough cast finished white. Hand-made sand-faced tiles are used for the roofing, and lead lights in steel casements for the windows. The strictest simplicity of treatment has been observed both inside and out.

The cost was 850*l.*; the builder was Mr. Jesse Mead and the architect Mr. Ernest J. Gee; both of Chesham.

THE BURLINGTON HOUSE LOAN EXHIBITION.

THE special interest of this year's Winter Exhibition at Burlington House may be said to consist in the works by Hogarth which are included in the collection of pictures in what is known as the Water-colour Room, though

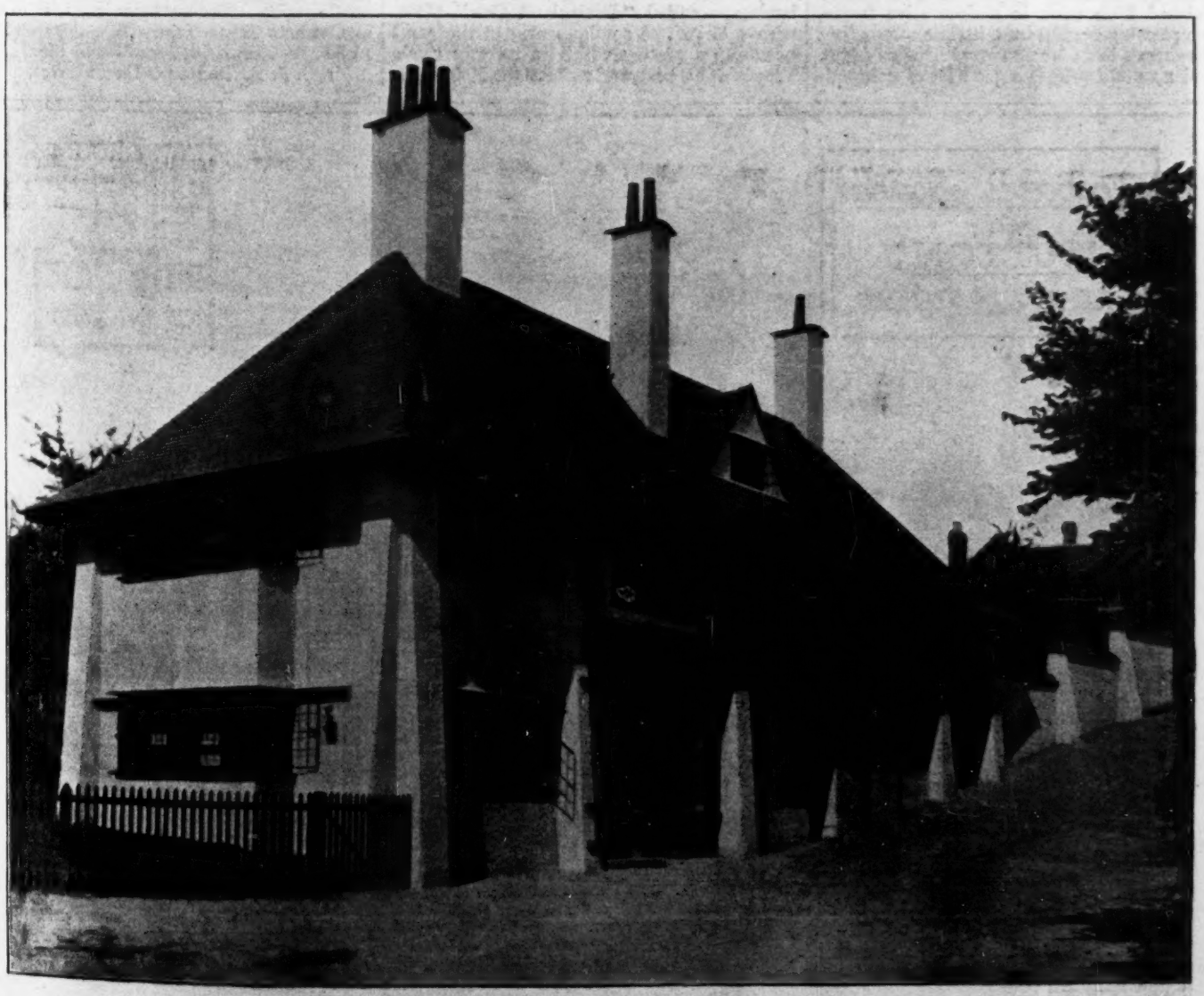


"Milton's Retreat," Chalfont St. Giles. Plan.

in this instance it is occupied by works in oil. A good many of these pictures, some of which are important, are not popularly known or familiar. Hogarth is always interesting in one way or another; either historically, as in his little painting of old Covent Garden (78) while it still retained somewhat of the likeness of a garden; or as a satirist; or in the capacity of a portrait painter of most expressive power; or as an adept in the effective arrangement and painting of pictures crowded with figures. This latter power is remarkably displayed in his large and highly finished picture of a scene from Dryden's "Indian Emperor" (104) as performed by children in 1731 "before the Duke of Cumberland and a distinguished company" in a palatial room in a great mansion. The whole is planned in a masterly manner as a composition, while every figure is a distinct study. "The Children of the Fourth Duke of Devonshire" (108) is another charming work, remarkable for the strongly marked individual character in the children's faces. Finest of all perhaps is the Royal Academy's own exhibit, "The Life School in St. Martin's-lane" (111), a splendid composition in which the grandly designed figure of the nude model forms the centre. This and Mr. John Murray's picture, "The First Performance of the Beggar's Opera" (85), are well known by engravings, but it is a treat to see the originals in all their force and brilliancy of perception and execution. "The Green Room, Drury-lane" (79), with portraits of Quin, Fielding, and Lavinia Fenton, is interesting both artistically and historically. The three sketches for a set of illustrations to Hudibras are somewhat too grotesque (but then so is the poem); the sketch for a picture of "The Staymaker" (100), however, is very interesting, as showing Hogarth's method of working up a picture of this class; had it been completed, it would have been a companion to some of the "Marriage à la Mode" set. In the "Portrait of a Gentleman" (92) we see yet another Hogarth; the Hogarth who could paint a life-size portrait in the finest and most dignified style, and could treat a uniform of blue with gold lace so as to render it a perfectly restrained and harmonious piece of colour. Hogarth was a most multifarious person, and it is this variety of power in him that is so well illustrated in this exhibition.

There is nothing in the same room to compare in interest with the Hogarths, except perhaps Gainsborough's small-scale portrait group of "The Pitt Family" (93); not of course the great minister, but he who was afterwards Lord Rivers, though he seems to show a family resemblance to portraits of William Pitt. Two or three works by Zoffany are worth seeing, though they look hard and commonplace by the side of the Hogarths. The "Black and White Room," which opens from the Water-colour Room, is devoted to water-colours; one of which, Turner's small drawing "On the Wharfe" (217), is one of the most interesting things in the whole gallery, as one of the many instances of the manner in which Turner anticipated almost everything that can be done in water-colour landscape. The foreground, river and rocks, is rather in the old water-colour school; beyond it is a background of trees the style and execution of which might, if it were cut off from the rest of the drawing, be attributed to Mr. North; it is not in the least like water-colour drawing of Turner's period. There are some examples in the room of David Cox; Girtin (including his well-known view of Durham); Varley; William Hunt (among them a quite wonderful bit of Still Life—223); Edridge, the nearly forgotten A.R.A., in whom some revived interest has lately been shown; and a large Copley Fielding, "Seaford from Newhaven" (222) which illustrates the danger of attempting to be too scenic in landscape painting, and explains why Fielding's is now rather a diminished reputation. In a corner of the room the sad face of Frederick Walker looks out at us in a small drawing by himself.

These two rooms, which are offsets from the main track, are really two of the most interesting in the exhibition; the main collection, containing much that is interesting to students in history of painting, does not contain very much to arouse enthusiasm in regard to the beauty and significance of the works in themselves. Gallery I. is devoted to early works (chiefly) of Flemish and Italian art. Among the interesting curiosities of the collection is an anonymous Flemish triptych of the XVth century (13), the centre panel representing with much rich detail the Adoration of the Kings, with the usual conventional architecture in the background; the side panels are the Nativity and the Presentation. The "Adoration" by Quentin Matsys (25) is in its way a really powerful work, especially in the intensity of devotion expressed in the countenance of the kneeling king in the foreground; the composition is exceedingly crowded, but has a good decorative effect nevertheless. Amongst various small pictures is a little "Marriage Feast at Cana" (9) by Gerard David—a few small figures flanked by a colonnade in perspective on the left, which is interesting. There is a Botticelli, "Virgin Child and St. John" (32), typical of the artist in its general features, though hardly Botticelli at his best; and there is a fine portrait of Queen Mary by Lucas de Heere. But the finest work in this first room is the half-length



"Milton's Retreat," Chalfont St. Giles. Mr. Ernest J. Gee, Architect.

portrait of Gabrielle de Bourbon (16) by François Clouet; a picture truly remarkable both for its fine and patient execution and for the careful painting of a face of unusually marked character. In this fine work expression and finish of detail go hand in hand, and to see it is to attach more importance to Clouet (or Janet, as he is also called) for the future.

Gallery II. contains a good many very uninteresting pictures, even among those bearing such celebrated names as Teniers, Ostade, Ruysdael, and others. The best available works of the Dutch School have probably already all been loaned, and we come to the second best; and the Dutch painters of "boor" scenes at their second best are not attractive. Ostade's capital little picture of "The Lawyer" (46), is an exception, and is in his best way as respects artistic unity and finish. There is a fine example of Terburgh (39), and a very remarkable picture by Ferdinand Bol, a half-length, on rather a large scale, of "A Peasant Woman" (41) leaning on the top of a half door and looking out, the door-opening forming a frame to the figure. There is a remarkable energy and vivacity about this figure, which to a certain extent reminds one a little of Murillo's pictures of personages of the lower order. As to some of the landscapes, what can one really care, now, for such works as the Ruysdael (42), the two Van der Neer moonlights, the seapiece by Ruysdael, the hard mechanical "View in Holland" (69) by Hobbema and Van de Velde? It is interesting to know that Ruysdael saw the sea (or imagined he saw it) that horrible colour, and that Van der Neer's was the best that could be done in his day to give an impression of moonlight (for he enjoyed a special reputation that way); but they are poor stuff in the face of modern landscape painting, and that is the truth. The little portrait of a man by Gonzales Coques (40), a highly finished little work in a decorative frame, is a pleasing example of a little known artist; Berghem's little landscape with figures (49), under an odd title, is a good bit of composition; and de Witte's "Interior of a Church" (48) shows whence Herr Bosboom gets his inspiration for the treatment of the same class of subject.

In Gallery III. the place of honour is occupied by one of these pictures of the Assumption of the Virgin which Murillo repeated with a good deal of the same composition and the same pose of the principal figure; and there is the large portrait group of Charles I. and his family with the name of Vandyck, a replica in which one may doubt how much is in the hand of the master. There are four Claudes, of which "River with Trees, at Sunset" (131) is the finest, and Turner's picture of the eruption of the Soufrière in 1812 (116)—exhibited in 1815, and more interesting historically than otherwise. The highest interest of the gallery centres round Reynolds, from whose inapparently inexhaustible store we seem to find new masterpieces every year. The finest are "Lady Elizabeth Herbert and Her Son" (145), one of Reynolds's richly coloured and rather Titianesque compositions, a good deal faded and altered probably, but still fine and effective; the charming group of "The Misses Paine" at the harpsichord (147); and the exquisite half-length of "Miss Orby Hunter" (148), evidently painted *con amore*, in one of Reynolds's most inspired colour moods. Romney also has some fine portraits in this room, but Romney has his special triumph in Gallery IV., in his portrait group of the Duchess of Gordon and her Son (174), noble and striking in its lines of composition. Among the pictures with a special interest in Gallery III. we should not omit to mention Kaspar van Vittel's large architectural panorama (123) of the Vienna of his period (early XVIIIth century); hard and un-pictorial enough, but very interesting as a topographical record.

In Gallery IV. there can be no doubt that the central attraction is Crome's splendid landscape called "Poringland Oak" (170), with a large tree as the centre of the composition; a picture which in its way rivals Troyon at his best, and reduces the Hobbemas and Ruysdaels to nullity. There are some fine portraits in this room; notably Opie's charming one of a little girl (158) seated on the ground and holding up one finger in a playful manner—a picture which rivals the charm of Reynolds's child portraits; Romney's portrait of Burke (169), in which he has contrived to produce an agreeable colour-harmony out of a blue coat, a yellow waistcoat, and a red background curtain—a feat recalling Gainsborough's success with the "Blue Boy"; and Sir W. Beechey's fine martial portrait of an officer in uniform (171). Cotman's grand sketch, for it is no more, of "Windmills in the Marshes" (181), should not be passed over; it is full of genius, and would have worked out into a splendid picture.

Gallery V. is occupied by a selection of the works of Hook, with Millais' grand portrait of him as a centre-piece. It is pleasant to see collected here so many of these fine sea and coast scenes, all well remembered and all worth looking at again. It is interesting also to see, from Hook's early picture "The Return of Torello" (201), exhibited in 1852, that he might have been a successful painter of figure subjects, had not a fortunate chance turned his attention to a class of subject in which he was able to realise a special style and excellence of his own. His joint ability in sea and figures is however well shown in the admirable work entitled "Luff!" in which attention is equally claimed by the figures and the boat and sea. But his finest works are those in which the sea is predominant, such as "Wreckage from the Fruiter," with the heavy and menacing gray breakers telling the story of the storm and wreck of the previous night.

PROPOSED HOUSE AT SUTTON.

THE walls of this house are to be covered with rough cast, and to have a red brick plinth to the height of the ground floor window-sills. The entrance porch is to be in Corsham Down Bath stone. The roof is to be covered with red sand-faced tiles.

Mr. S. J. B. Stanton is the architect.

THE GATEHOUSE, LINCOLN'S INN.

We are indebted to Mr. John Quekett for the careful sketch of this well-known and interesting bit of old London brick architecture, which narrowly escaped destruction some years ago at the hands of the lawyers and at the prompting of a too well-known amateur architect of their body.

Possibly it may still not be safe, and if so, the illustration may eventually become a valuable record.

Builders' and Contractors' Column.

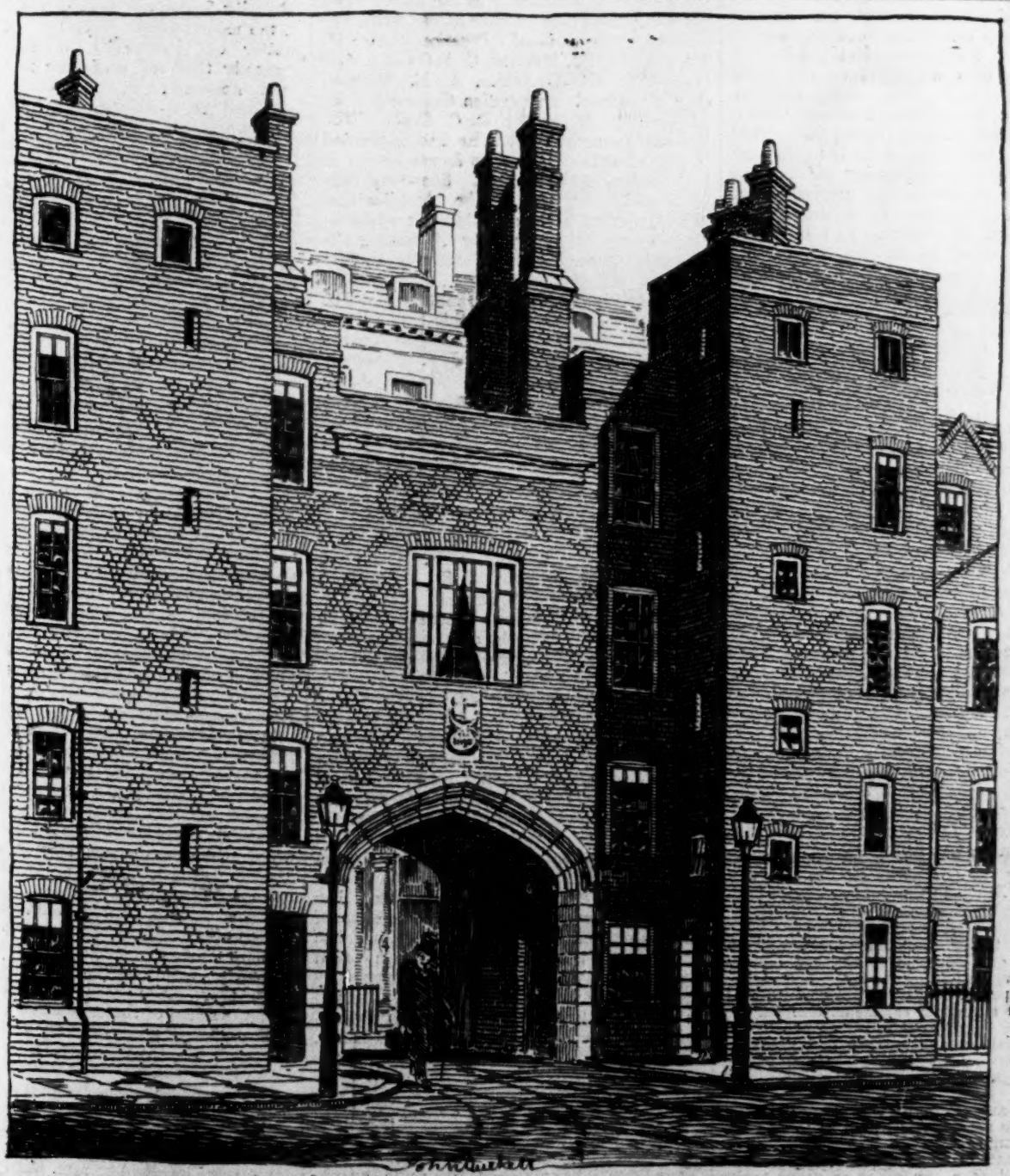
Workmen's Compensation.

Four cases have recently been decided by the Court of Appeal on how the amount of compensation has to be calculated under the new Workmen's Compensation Act. The court experienced the greatest difficulty in construing the Act, and it is remarkable that the combined wisdom of two Parliaments has failed to devise an adequate scheme, expressed in clear language, by which compensation can be computed. It is as unfortunate as it is remarkable, since it prevents those intended to be benefited by the Act from obtaining compensation without litigation.

The first paragraph of Schedule I. is nearly in identical terms with the Act of 1897, but the second paragraph, which was devised by the Legislature to elucidate the matter, is that which has now occasioned further difficulty.

The first paragraph provides for the calculation of compensation where "average weekly earnings" are capable of being proved, but the new second paragraph was inserted to provide for cases where no average earnings with an employer are capable of being referred to. It is as follows:—For the purposes of this schedule relating to "earnings" and "average weekly earnings" the following rules shall be observed:—"Average weekly earnings shall be computed in such manner as is best calculated to give the rate per week at which the workman was being remunerated. Provided that where by reason of the shortness of the time during which the workman has been in the employment of his employer, or the casual nature of the employment or the terms of the employment, it is impracticable at the date of the accident to compute the rate of remuneration, regard may be had to the average weekly amount which during the twelve months previous to the accident was being earned by a person in the same grade, employed at the same work by the same employer, or, if there is no person so employed, by a person in the same grade employed in the same class of employment and in the same district."

The word "grade" in this connexion appears never to have been interpreted, but the Court of Appeal have now decided that it indicates the particular rank in the industrial world, such as mason, bricklayer, bricklayer's labourer, which the workman occupies, apart from individual qualities of the workman in that rank. The court, however, intimated that individual characteristics of the workman and particular conditions of his trade should, in addition, be taken into consideration. Turning now to the four cases before the court, we can observe the application of the above principles. In Perry *v.* Wright the applicant, a casual dock labourer, had worked only two days for a master stevedore when he sustained injury. He had been working casually on odd jobs for some time, and the County Court judge held that it was "impracticable at the date of the accident to compute the rate of remuneration." The County Court judge also held that there were no definite grades among dock labourers except as good or bad workmen, and he placed the applicant in the latter category. The Court of Appeal sent the case back with a direction to the County Court judge that he must determine whether dock labourers form a distinct grade with the average wages



The Gatehouse, Lincoln's Inn From a Sketch by Mr. John Quekett.

in that grade, and then consider the applicant's qualifications. Should there be no grade the court laid it down that this paragraph had no application, and that the judge must arrive at the amount of compensation as best he could.

In Cain *v.* Leyland Company a casual shipwright was killed on the morning he commenced work for the respondents. The respondents had regular hands and casual hands, and the County Court judge divided these into two grades, awarding compensation on the average earnings of the casual grade, and the Court of Appeal refused to disturb these findings.

In Gough *v.* Crawshay Brothers, Ltd., a collier employed by the respondents on March 28, 1906, was injured by accident; for a time he was paid compensation, 15s. 8d., but on December 12, 1906, was placed at light work carrying batteries, being paid half the difference between his old wages and what he earned at light work, and whilst so employed he was killed. The County Court judge placed him in a grade of battery carriers, and the Court of Appeal affirmed the judgment.

The last of the four cases considered, Bailey *v.* Kenworthy, turned on subparagraph (c) of paragraph 2, which provides "employment by the same employer shall be taken to mean employment by the same employer in the grade in which the workman was employed at the time of the accident uninterrupted by absence from work due to illness or any other unavoidable cause." The applicant, a cotton spinner, was injured after having been employed by the same employers for more than twelve months. His receipts during the previous twelve months were 83*l.* 2s. 1d. During that period the mills had been stopped for the following causes—owing to a canal having burst, owing to accidents to machinery, during Bank Holidays and "Wakesweek," a period when no mills work in Ashton. The Court of Appeal commented on the wording of this subparagraph, but held these interruptions to have been unavoidable causes, and that the periods of time lost ought not to have been computed so as to reduce the average wages. The amount earned ought to be considered in relation to the actual time worked.

In conclusion, we may refer to the case of Cremens *v.* Guest, Keen & Nettlefold, Ltd., in which the Court of Appeal had to consider whether a man leaving work by a train supplied by his employers was "in the course of his employment" at the time of the accident, and in which the court endorsed the view we ventured to express in an article on November 2 last.

The workman lived six miles from the colliery. The men were conveyed to their work by a train composed of carriages belonging to the respondents, but driven by the Great Western Railway Company; they alighted on a platform erected, repaired, and lighted by the respondents. In boarding the train a rush took place, and the man was pushed off the platform and killed. The court held that it was an implied term of the contract of employment that the trains should be provided, and that the man was acting therefore "in the course of his employment" when he was killed.

REPORT OF THE COMMITTEE ON DANGERS IN BUILDING OPERATIONS.

Warren-lane Works,
Woolwich, January 7, 1908

SIR,—We thank you for yours of the 3rd calling our attention to the full text of the draft suggestions made by the Building Accidents Special Committee in your issue of the 4th, and asking for comments thereon.

We have gone carefully through the numerous clauses, and do not find anything very substantially different to the methods at present adopted by other large contractors and ourselves.

As you have given us the opportunity of doing so, we should, however, like to add the following comments:—

Firstly, that, in our opinion, no suggestions or rules will have any effect or prove to be beneficial unless the workmen co-operate more fully with their employers in the future than has proved to be the case in the past, in endeavouring to avoid accidents.

We have for several years past had notices printed and exhibited on our various works asking workmen to call the attention of the foreman or ganger to any plant or machinery they find defective—we, however, fail to find a single record of such a thing having been done on any job.

Secondly, the men must also exercise more care themselves in carrying out the requirements such as those recommended.

A member of this firm, visiting a contract recently, found two men, who had been deputed to put up a scaffold for lime-whiting, standing upon *one* scaffold board, while a stack containing some 200 boards was lying idle close by. We paid off the men as an example to the others employed on the work.

We regret to say that carelessness appears to be much more marked when jobs are nearing completion, and more especially since the passing of the recent amendments to the Act. In the last few months the number of accidents has grown to such an extent that a few weeks back we considered it necessary to address a letter to the Secretary of the London Master Builders' Association upon the subject.

KIRK & RANDALL.

Architectural Societies.

ROYAL INSTITUTE OF THE ARCHITECTS OF IRELAND.—The usual monthly meeting of the Council was held at 20, Lincoln-place, Dublin, on the 6th inst. The President, Mr. Frederick Batchelor, in the chair. The following Standing Committees were appointed. *Professional Practice.* — C. H. Ashworth, W. M. Mitchell, C. A. Owen. *Arts Committee.*—G. J. Ashlin, A. E. Murray, G. P. Shendans. *Publication Committee.*—H. Allberry, R. M. Butler, R. C. Orpen. The President announced that he had appointed Mr. R. C. Orpen to act as *locum tenens* in his absence. The Hon. Secretary was instructed to write to the Architectural Association of Ireland asking for observations as to the advisability of making the Institute Prize, presented annually to that body, a travelling studentship.

ULSTER SOCIETY OF ARCHITECTS.—The annual general meeting of this Society was held at 13, Lombard-street, Belfast, on the 30th ult., the President, Mr. J. J. M'Donnell, J.P., being in the chair. Messrs. J. P. M'Grath, E. R. Kennedy, and S. J. M'Avoy were appointed scrutineers, and declared the following elected as officers and Council for the ensuing year:—President, the Right Honourable Robert Young, J.P.; vice-president, Mr. W. J. Gilliland, F.R.I.B.A.; honorary treasurer, Mr. J. J. M'Donnell, J.P.; honorary secretary, Mr. N. Fitzsimons, F.R.I.B.A.; members of Council, Messrs. R. M. Young, J.P., Henry Seaver, and J. St. J. Phillips; associate members of Council, Messrs. H. Lamont and T. Houston; honorary auditors, Messrs. F. H. Tulloch and J. Ferguson. Mr. Anthony T. Jackson was elected an honorary member of the Society. The annual report of Council, as circulated among the members, was adopted; it contained the following:—Four members, two associates, and two students have been enrolled, making a total membership of ninety. The desired alliance with the Royal Institute of British Architects cannot yet be recorded as an accomplished fact owing mainly to the persistent opposition on the part of the Royal Institute of the Architects of Ireland. Your Council has continued, however, to press the claims of the Society on the British Institute, and has pointed out the anomalous position taken up by the latter, inasmuch as it entrusts the conduct of its examinations for all Ireland to your Society, and at the same time maintains that the time is not yet ripe for alliance. The examinations in connexion with the Royal Institute of British Architects were held in Belfast by the Society in June and November, when eight out of the nine candidates who presented themselves were successful in passing the examination. Your Council has watched with some concern the growing tendency on the part of the City Surveyor's department to take upon itself, in spite of a resolution on the books of the Corporation condemning such a practice, the designing and execution of architectural works of some magnitude, thus inflicting a serious injury on the profession in Belfast, at the same time involving the ratepayers in a large expenditure without any effective guarantee that the public funds will be judiciously disbursed, or that the buildings so erected will be in any way worthy of the city. The undue development of the Works Department is at the same time doing grave injury to the building trade, and by doing away with healthy competition is causing a loss to the ratepayers which reflects seriously on the commercial ability of the spending committees. The attention of urban district councils has again been called to the position occupied by their surveyors, who have the power to approve of plans prepared by themselves, and to approve or disapprove of plans prepared by architects who are in competition with them for private practice. As a result of representations made by your Council at a recent election of a surveyor to the Holywood urban district, the appointment was made subject to such conditions as dealt in a satisfactory manner with this anomaly. It is satisfactory to be able to report that the relations of your Society with the Belfast Builders' Association and the Belfast Quantity Surveyors' Society continue to be of the most friendly character. It will be a matter of gratification to the members generally that the profession in Ulster has been honoured in the person of your esteemed fellow-member, Mr. Robert Young, J.P., whom his Majesty has been graciously pleased to appoint to his Most Honourable Privy Council in Ireland. The Honorary Treasurer's report, showing a satisfactory credit balance on the year's working, was unanimously adopted. The proposed alterations to the by-laws were, after discussion and amendment, agreed to. A cordial vote of thanks to the Chairman brought the meeting to a close.

Books.

Les Origines du Style Gothique en Brabant. Par RAYMOND LEMAIRE. Première Partie: L'Architecture Romane. (Bruxelles. 1906.)

MONOGRAPHS have been written on many individual churches of Belgium, but M. Lemaire tells us that few works have been devoted to a general survey of the lesser monuments of the country. He sets himself the task of describing the churches of the one Province of Brabant, which lies in the centre of Belgium, and contains as chief towns Brussels and Louvain. This special subject is preceded by chapters on Romanesque in general, and its particular manifestations in Belgium. It is noteworthy that not one Romanesque church in this country remains intact. Alterations and restorations have played such havoc that generally the tower is the only surviving Romanesque feature. A careful examination of the churches of this province has convinced M. Lemaire that many more of them are of Romanesque origin than is obvious from a superficial glance. Choirs, aisles, or transepts may have been added—even the proportions of the nave arcades altered—but further observation often discloses Romanesque clearstory windows hidden by the plaster, and these sometimes point to the fact that alternate nave piers have been removed in the modernisation of the old church.

Brabant possesses only one church of the first rank, *i.e.*, the Collegiate Church of Sainte Gertrude at Nivelles, which contains examples of all the Romanesque features found singly in the smaller churches. Elsewhere there is a curious absence of the mouldings and ornament usually connected with this style. Vaults are hardly less rare. They are only

found over small spans, such as aisles and transepts, and are chiefly of the barrel or groined varieties. Flat wooden ceilings have never survived, but occasionally one finds the old roof timbers still in position. The plans partake nearly always of the Basilica type, with sundry variations, according to the absence or presence of a narthex—and the central or western position of the towers. In part of the province apsidal terminations are prevalent; elsewhere a square-ended choir is more usual.

Romanesque in Brabant, especially as regards plans and arcadings, partakes of the characteristics of the Rhine and the Meuse provinces, and some quite French features can be traced, though Belgian work is one hundred years later in point of date.

Some interesting pages give a list of the Romanesque remains to be seen in the towns most often visited by tourists; but the fragments are comparatively limited, though doubtless interesting to the student.

The book is fully illustrated by views and drawings, many of them from the author's own measurements. The index leaves much to be desired, and would need to be much fuller for facility of reference.

House Decoration and Repairs. By C. ORLANDO LAW. (London: John Murray. 1907.)

THE title of Mr. Orlando Law's book, "House Decoration and Repairs: a Practical Treatise for Householders, Craftsmen, Amateurs, and others," is hardly justified by its contents. It is very much a book for amateurs, or rather—for there is no reason why we should do amateurs an injustice—for those amateurs who are satisfied with the shadow rather than the substance. The author writes with enthusiasm of his many little artifices for transforming, or, as he calls it, decorating, the ordinary room, with false ceiling beams, sham panelling, and gimcrack joinery. There is a great deal of useful information on practical details of repair in the book; but in any question of decoration there is a total lack of understanding of the principles of design. It is a great thing to get people interested in the houses in which they live, at times unwillingly; but teaching on questions of decoration should be constructive rather than superficial. Sham constructive features of all sorts must be the first things to sweep away and avoid. Plain carpets and distempered walls are good things in themselves, they make an excellent background for fine furniture, pictures, and china; we may well be thankful for the restfulness they bring to a house previously decorated with Victorian or Art Nouveau wall-papers and carpets. It is a mistake, however, to lead people to suppose that a badly-planned and ill-proportioned house or room can be put right by paint or wall-paper; something may be done to alleviate the heritage of vulgarity of the last hundred years (that vulgarity was, at any rate, substantially constructed), but it must not be on the lines suggested by Mr. Law, the only recommendation of whose recipes is their flimsy and ephemeral character.

A Manual of Wood-Carving. By WILLIAM BEMROSE, F.S.A. Twenty-second edition. (London and Derby: Bemrose & Sons. 1906.)

THIS is a practical manual on wood-carving, with an introduction to the subject on the historic side. The introduction contains the gleanings of an enthusiast for the history of his subject told in an attractive way. The plates at the end of the book, illustrating fine examples of old furniture, are well drawn; those of modern design, with their descriptive text, show complete unconsciousness of the lessons contained in the old examples, and no worse examples could well be placed before a student of any ability. The practical instructions about woods and the tools and their uses are to the point, yet they form but one side of the craftsman's outfit; the enthusiastic wood-carver can only excel in his art after years of study of design in the wider sense.

Practical Church Decoration. By ARTHUR LOUIS DUTTRIE. (London: The Trade Papers Publishing Company, Ltd. New York: "The Painter's Magazine." 1907.)

THIS little book is one of the "Decorator" series, and will probably prove very useful to students in the decorator's trade, as an introduction to the subject of colour decoration of ecclesiastical structures. The letterpress contains a great deal of practical information, and the illustrations to the chapter on symbolism are excellent in design and drawing. The drawings throughout are good in matters of detail; in the large question of design the outlook is more limited, but, as it is a handbook for trade students and not for architects, this is less of a disqualification than it otherwise would have been.

Cabinet Work and Joinery. Edited by PAUL N. HASLUCK. (London: Cassell & Co. 1907.)

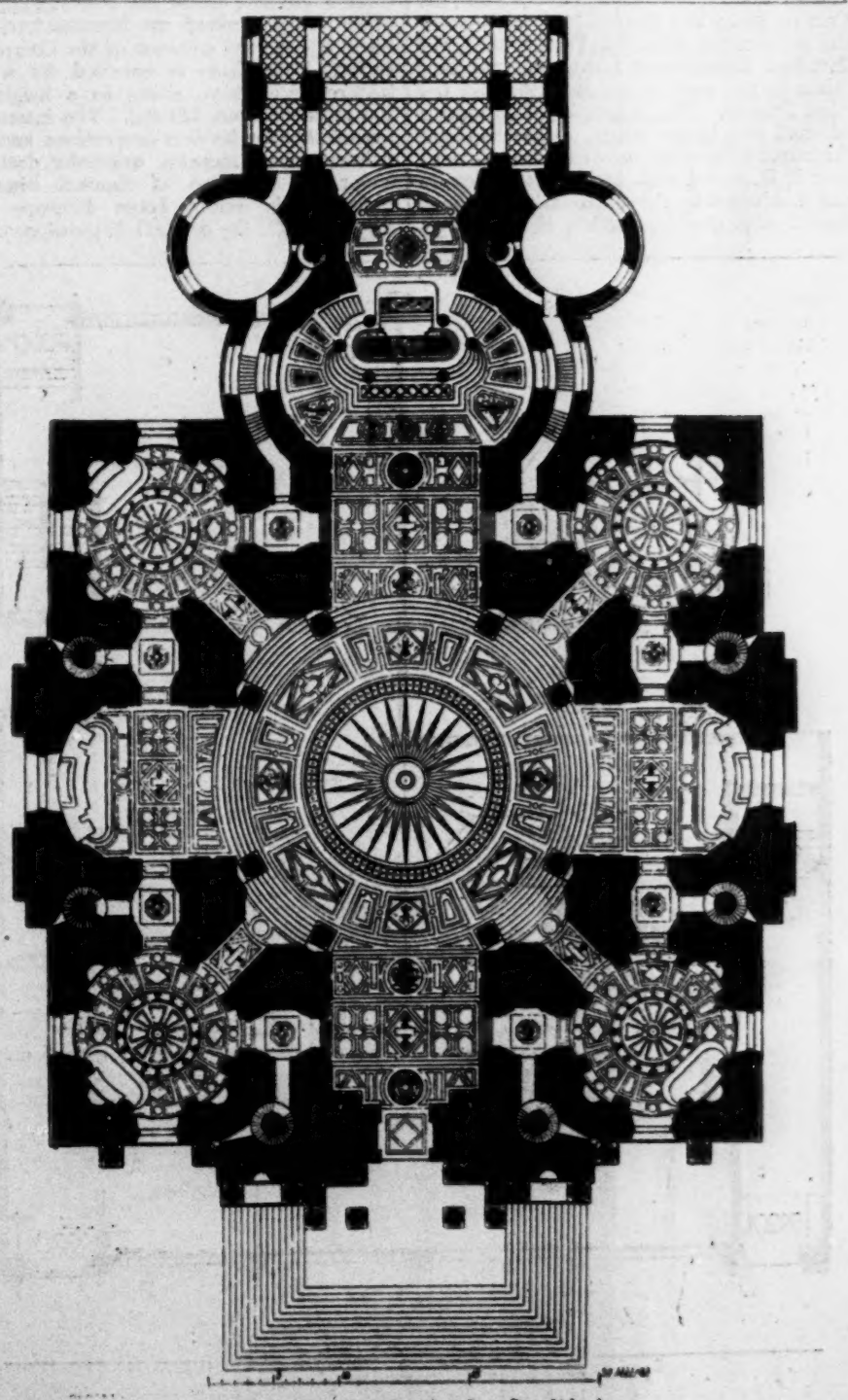
"CABINET Work and Joinery," by Mr. Paul N. Hasluck, is a sequel to "Carpentry and Joinery," by the same author, with which it is uniform in style and price. In comparatively small compass and at a very low price, the purchaser possesses nearly 600 pages of text and over 2,000 text illustrations of joinery and furniture. The illustrations are readable working drawings, capable of being understood and followed by the merest amateur. It is unfortunate that with few exceptions the designs are the worst type of trade article. In this connexion we hope that the classes in joinery and design undertaken by the London County Council, and which already show such excellent results, will soon begin to bear some fruit in the joinery trade.

Illustrations.

RENAISSANCE AND MODERN CHURCHES OF PARIS.

I.—LES INVALIDES.

AFTER having entered the Hôtel des Invalides by the main entrance we traverse a great square court-yard and come on the opposite side to the portal of the church built



Plan of the Church of "Les Invalides."
(From Isabelle's "Edifices Circulaires.")

(1671-1674) from the designs of Libéral Bruand, specially for the use of the occupants of the establishment, and which must not be confounded with the domed church reserved for Royal use, which was commenced in 1675 from the designs of Hardouin Mansart, and completed in 1703. This second church, of which the illustration is shown from the choir end (what we should call the "east end," only it is not orientated), is a prolongation of the first, from which it is separated by a large arcade which forms a means of communication between the two churches. Both of them, that of the "Soldats" and of the "Roi," were originally dedicated to St. Louis, but the first church alone is at present devoted to Catholic worship.

Though it is with Mansart's building (originally at all events a church) that we are here specially concerned, some particulars as to the "Soldats'" church may be of interest. This is 70 metres long internally by 22 wide, with a nave and side-aisles surmounted by tribunes forming a triforium; the bay next the entrance contains a fine organ, dating from the XVIIth century, supported on Caryatides in gilt bronze. From the vault hangs a many-coloured assemblage of flags taken in the wars in Africa, China, the Crimea, Italy, and Mexico. At the time of the entry of the Allies into Paris in 1814, the Invalides burned some fifteen hundred flags taken in the wars of the Republic and the First Empire. The pulpit, in white marble adorned with bronze reliefs, is placed against the fourth pillar of the nave; the sound-board over it is carved with garlands and flowers and terminated by a royal crown. The choir, floored with marble, consists of three bays similar to those of the nave, leading up to the arch which gives access to the second or Royal Church with its well-known dome, the subject of our illustration. Oak stalls, of very simple design, are ranged on each side of the choir, which is enclosed by a grille in upright iron and copper. In the centre is a high altar of white marble, with a tabernacle in gilt bronze. Beneath the nave is a mortuary chapel. The general aspect of the interior, in which may be seen some monuments to Marechals of France, is of great simplicity, and has an imposing aspect, though without the decorative richness of the domed church which forms the southern extremity of the Hôtel des Invalides.

This latter is approached from the Place Vauban (from which the illustration is taken), from which it is separated by a large court enclosed by a grille. The exterior façade is decorated with statues of Charlemagne and Saint Louis, by Coysevox and Coustou. In the attic are other statutes symbolising Justice, Temperance, Prudence, and Force. Above these rises the celebrated dome, the gilt cupola of which is prominent in every view of Paris.

The dome, decorated with twelve gilt ribs with gilt trophies in the interspaces, rises from a circular drum on two stories, the upper story divided up by pilasters, the lower by coupled columns of the Composite Order. The whole is crowned by a gilt lantern and flèche, rising to a height of 105 mètres (about 340 ft.). The interior is remarkable for its fine proportions and the richness of its mosaics, originally designed under the direction of Mansart himself; unfortunately under Louis Philippe and Napoléon III. the original disposition of the designs was somewhat altered and not improved. In the centre under the dome is the open crypt containing the tomb of Napoléon.

On the north side of the choir is the high altar, under an immense baldacchino supported by columns of black veined marble. The general effect is imposing, but the sculptural decoration is modern—the work of Triqueti, Feuchères, and Husson. The painted decorations of the cupola belong to the date of the church, and were executed by Jean Jouvenet, who has represented the twelve apostles on the twelve divisions of the dome. In the transept on the left is the tomb of Turenne, executed by Tuby from the designs of Lebrun. In the other transept is the tomb of Vauban, a modern work by Etex. Eight lateral chapels, of unequal height, contain monuments; among them that of Jerome, King of Westphalia, by Guillaume, and of Joseph, King of Spain, designed by the architect Crépinet. The cupolas of these chapels are decorated with paintings by Boullogne, Doyen, and Coypel.

The entrance to the funeral crypt is under the high altar. It is decorated with large figures in bronze by Duret, symbolising "La Force Civile et Militaire." On a marble tablet are inscribed the words of Napoléon in his will:—

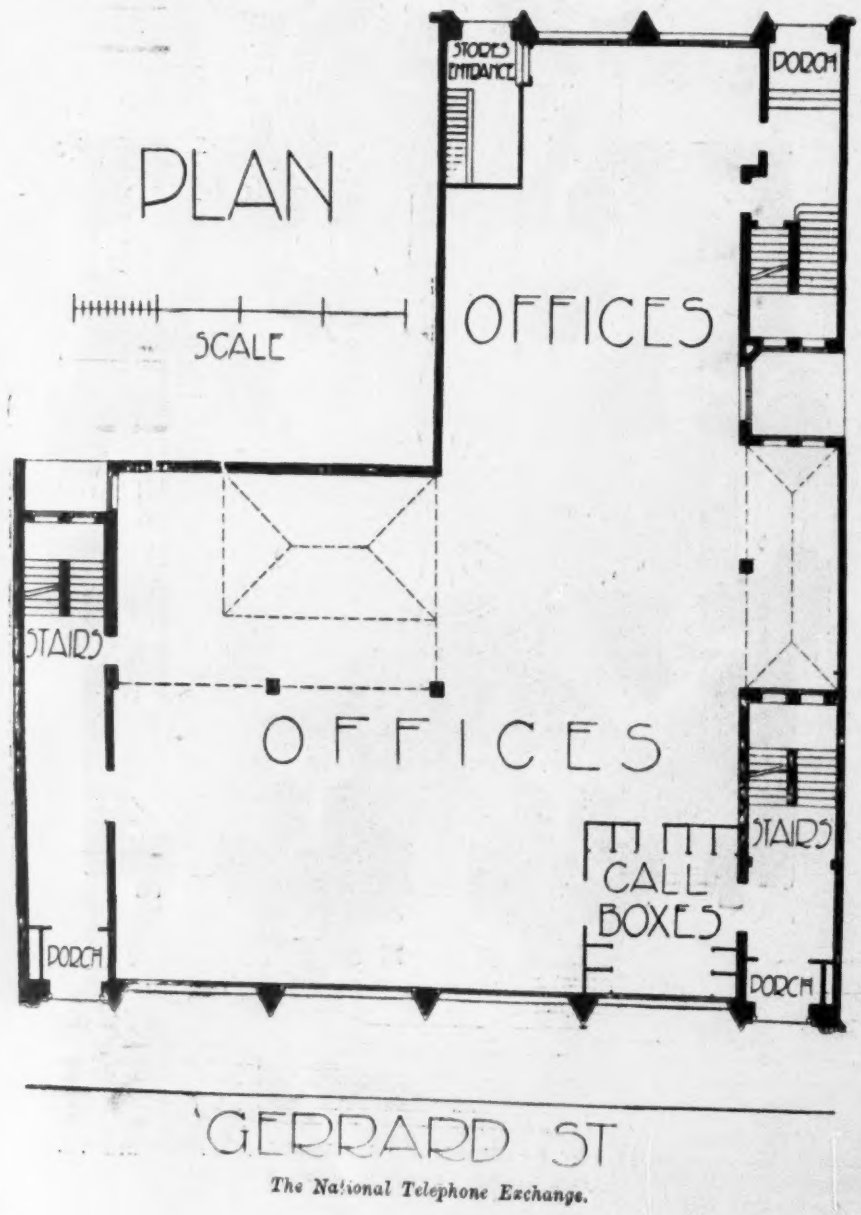
"Je désire que mes cendres reposent sur les bords de la Seine, au milieu de ce peuple Français que j'ai tant aimé."

The crypt, in white marble with a floor of coloured marbles, is 6 mètres deep and 23 mètres in diameter. It is decorated with basreliefs representing the principal events of the Imperial reign.

The monument was the subject of a competition in which the eminent architect, Visconti, carried off the prize. The work, commenced in 1843, was interrupted by the Revolution of 1848, and was not completed till 1858. The tomb occupies the centre of the space, and consists of a sarcophagus of red porphyry from Finland, on a base of green granite from the Vosges. Around it is a covered gallery decorated with allegorical reliefs by Simart. Twelve colossal figures by Pradier, set against the surrounding wall, symbolise the principal victories of the Empire, and have the appearance of being guardians of the tomb. At one side, a subterranean chamber on the plan of a cross encloses a reliquary designed by Crépinet, standing on a base of red granite decorated with eagles with outspread wings in gilt bronze. There is also, in this apartment, a white marble statue of Napoléon in his coronation robes.

Though somewhat disfigured by the works executed under the monarchy "de Juillet" and under Napoléon III., the church of the dome, on which Mansart has set the imprint of his genius, still remains the finest religious monument erected in France since the Renaissance.

The illustration is from the first of a set of photographs taken specially for the *Builder* by M. Albert Lévy, photographer, of Asnières.



The National Telephone Exchange.

NEW TELEPHONE EXCHANGE FOR THE NATIONAL TELEPHONE COMPANY, LTD.

THIS building, which is taking the place of the old Pelican Club, which for the last few years has been used as the "Gerrard" Telephone Exchange, has been designed as an exchange for about 10,000 subscribers. This part of the accommodation is provided for on the upper floors, the lower ones being used as offices and stores.

The perspective view shown is taken from Gerrard-street, there being another somewhat similar, though shorter frontage towards Lisle-street.

The materials used are Portland stone and red brick facings. The contractors are Messrs. Killby & Gayford, of Finsbury; and the architect Mr. Leonard Stokes, of Westminster.

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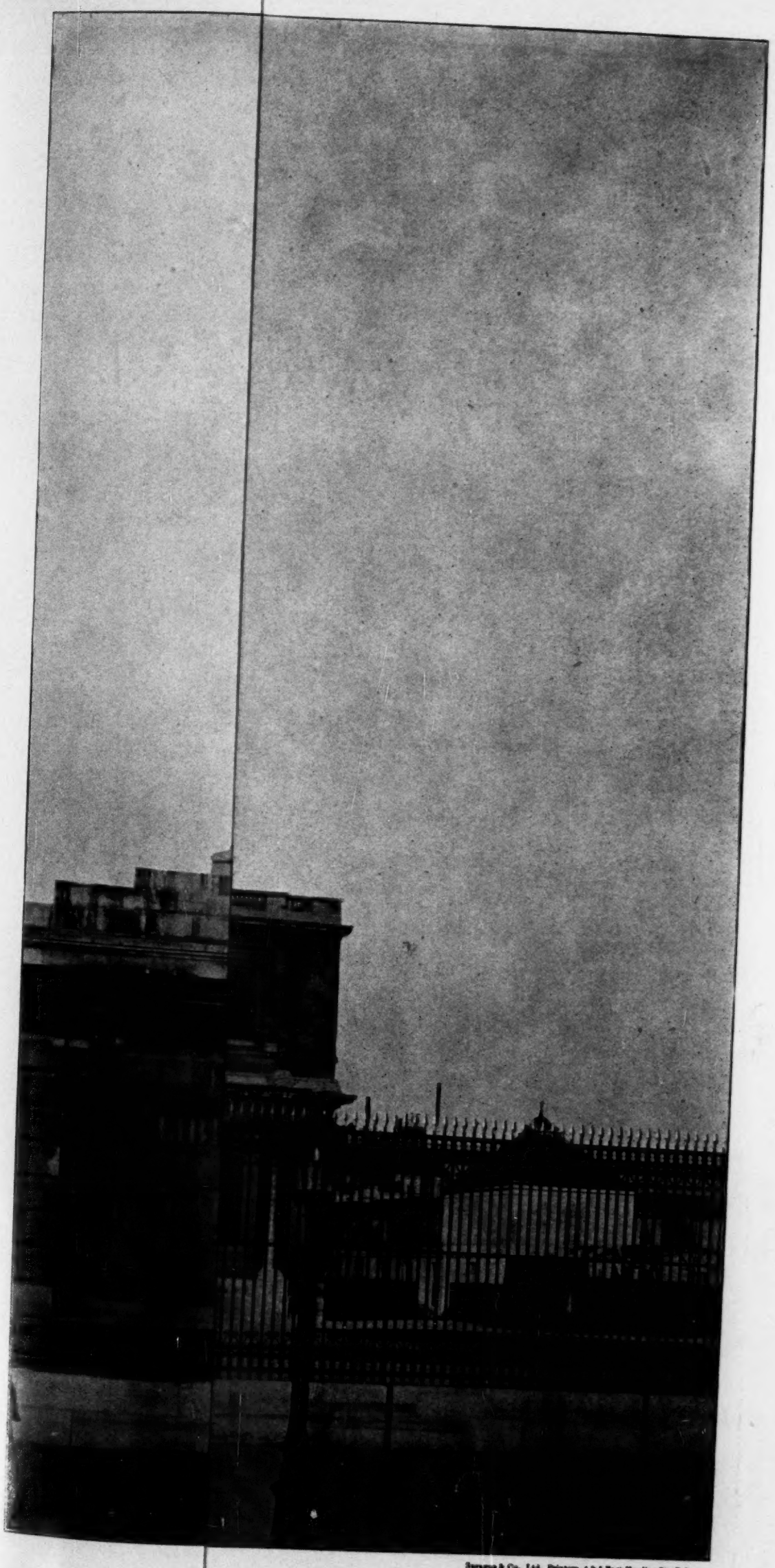

Spottiswoode & Co., Ltd., Printers, 54 & 5 New Street Square, E.C.

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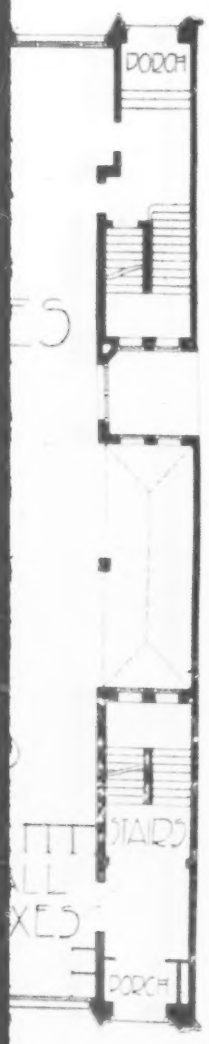

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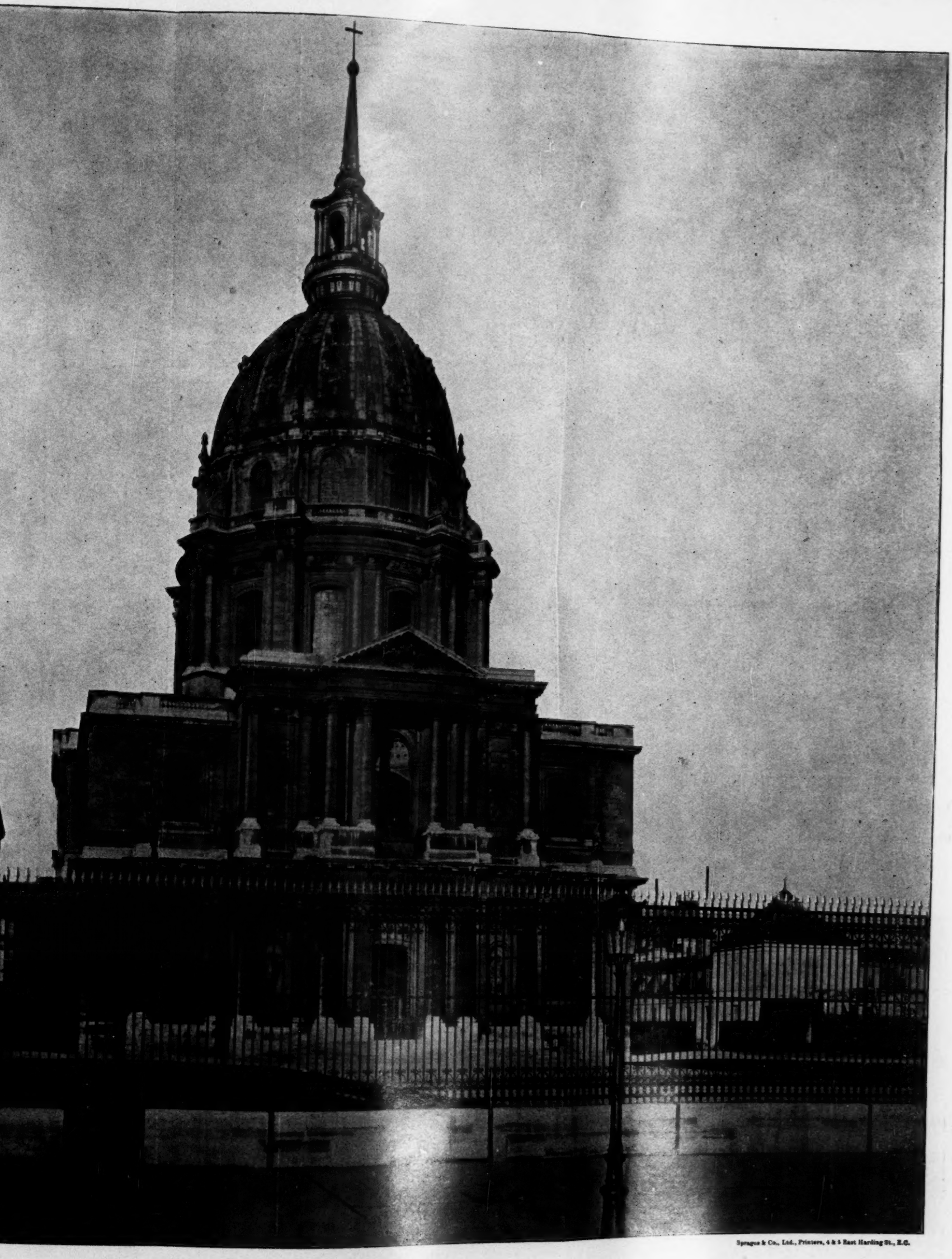

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RENAISSANCE AND MODERN CHURCHES OF PARIS.—I. LES INVALIDES.

NATIONAL TELEPHONE EXCHA

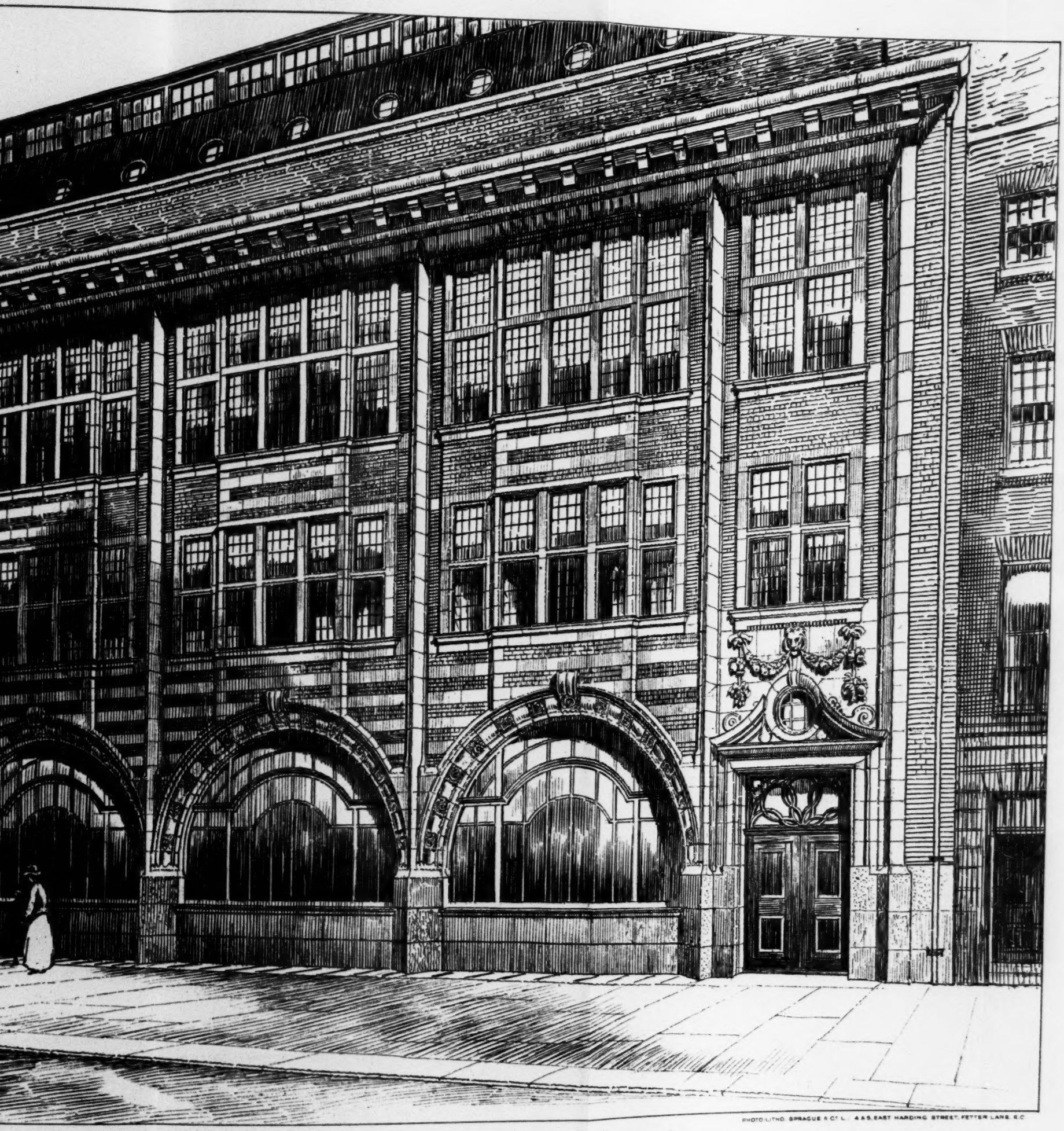
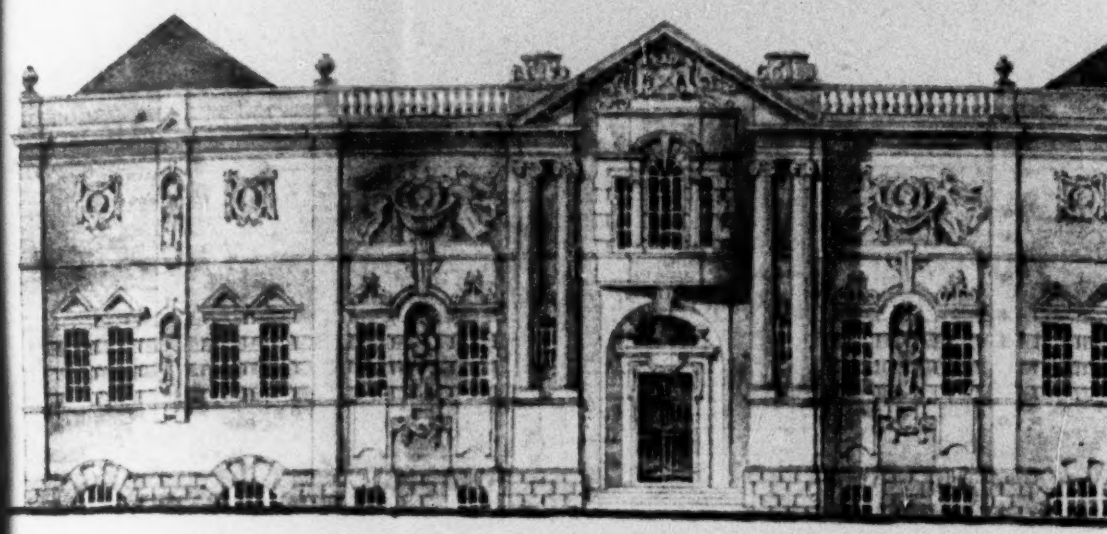


PHOTO-LITHO. SPRAGUE & Co LD. 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

TELEPHONE EXCHANGE, GERRARD STREET, SOHO.—Mr. Leonard Stokes, F.R.I.B.A., Architect



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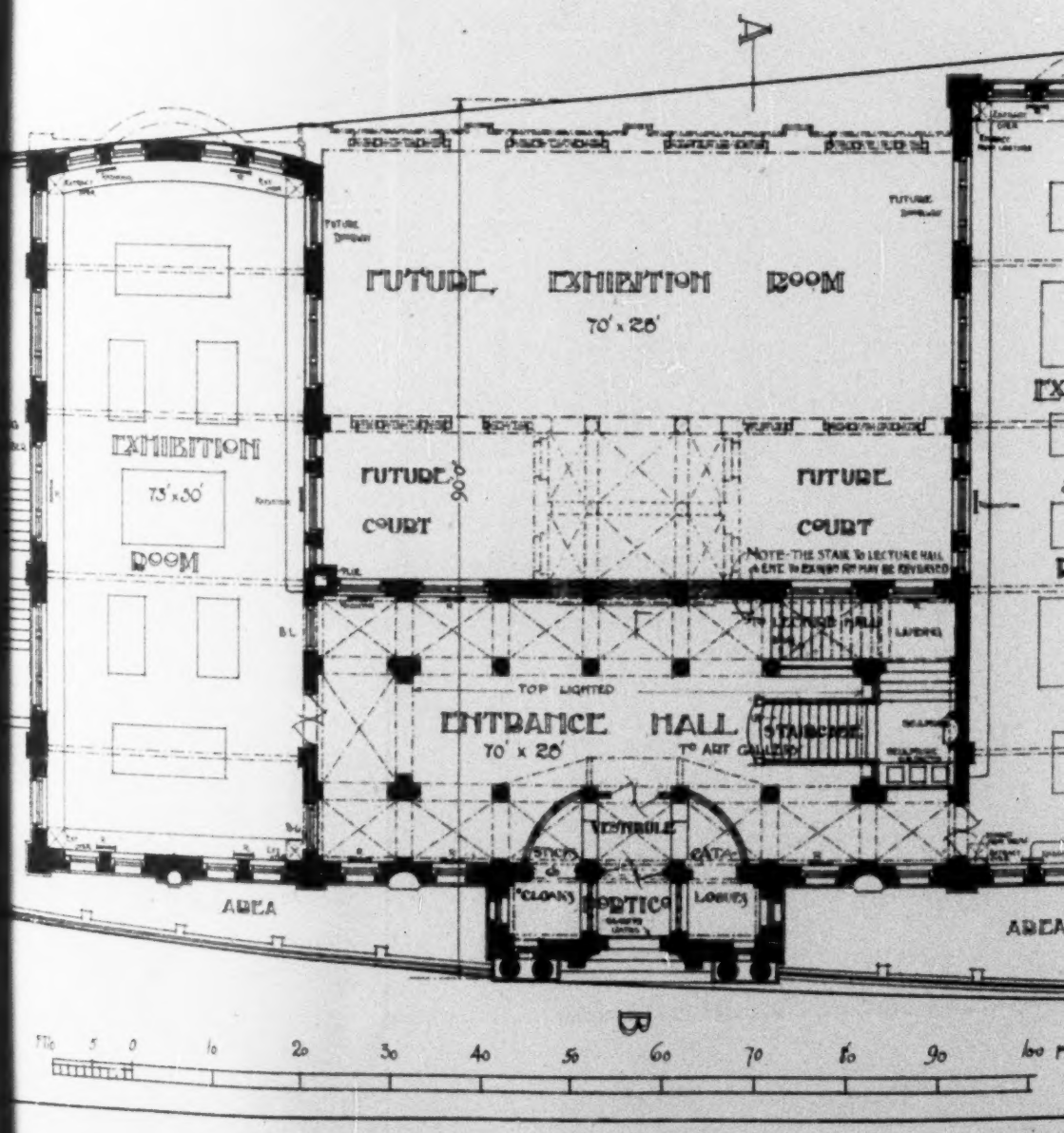
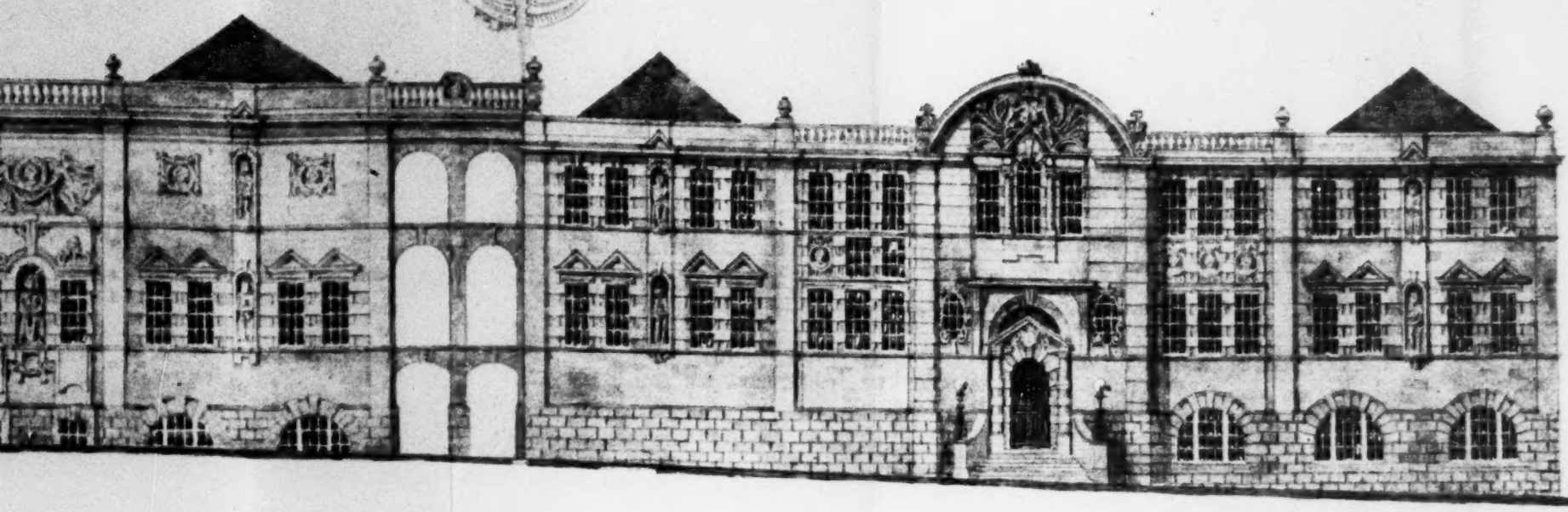


USEUM AND ART GALLERY PLYMOUTH 1906 AND FREE LIBRARY



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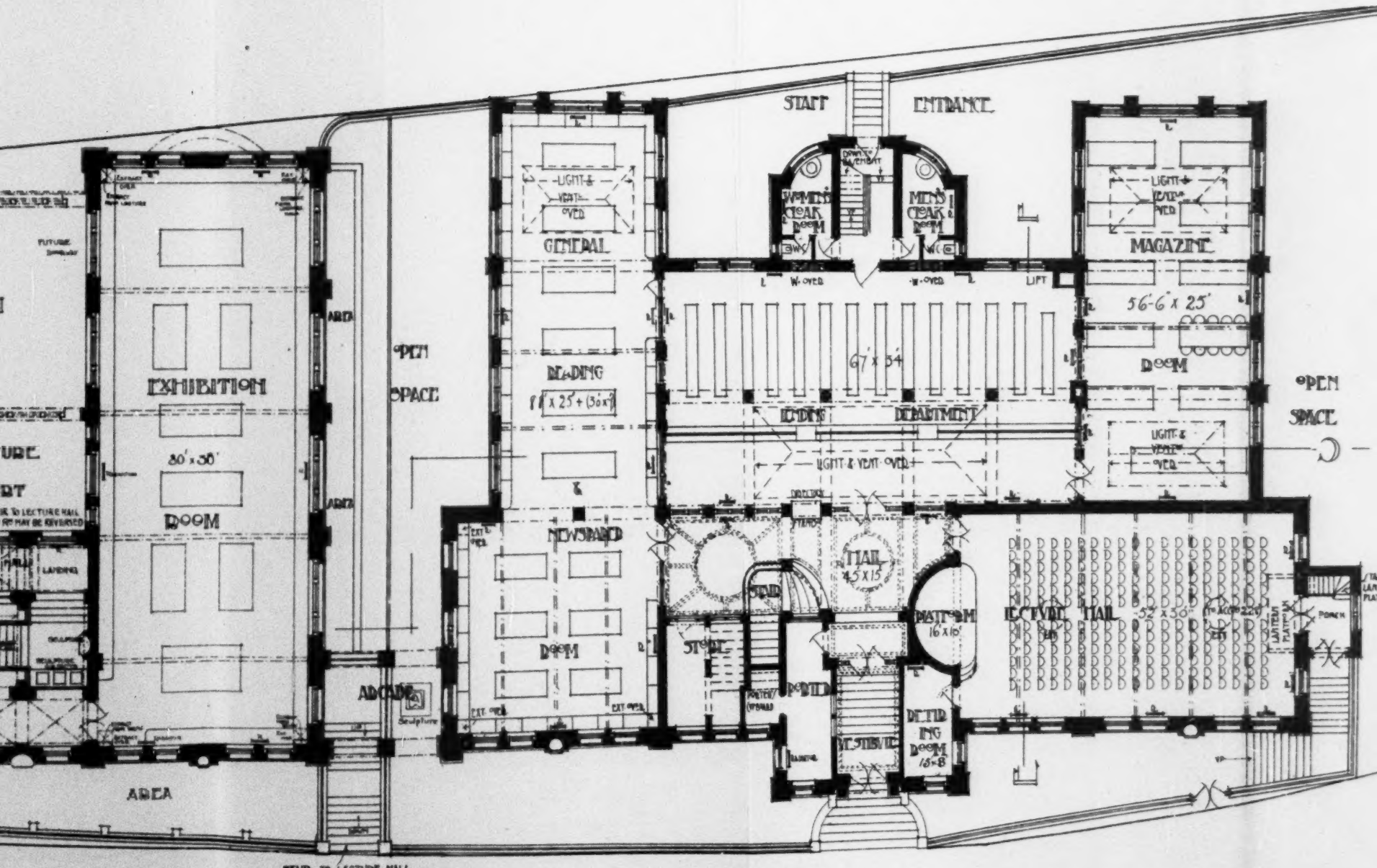
Architect 1907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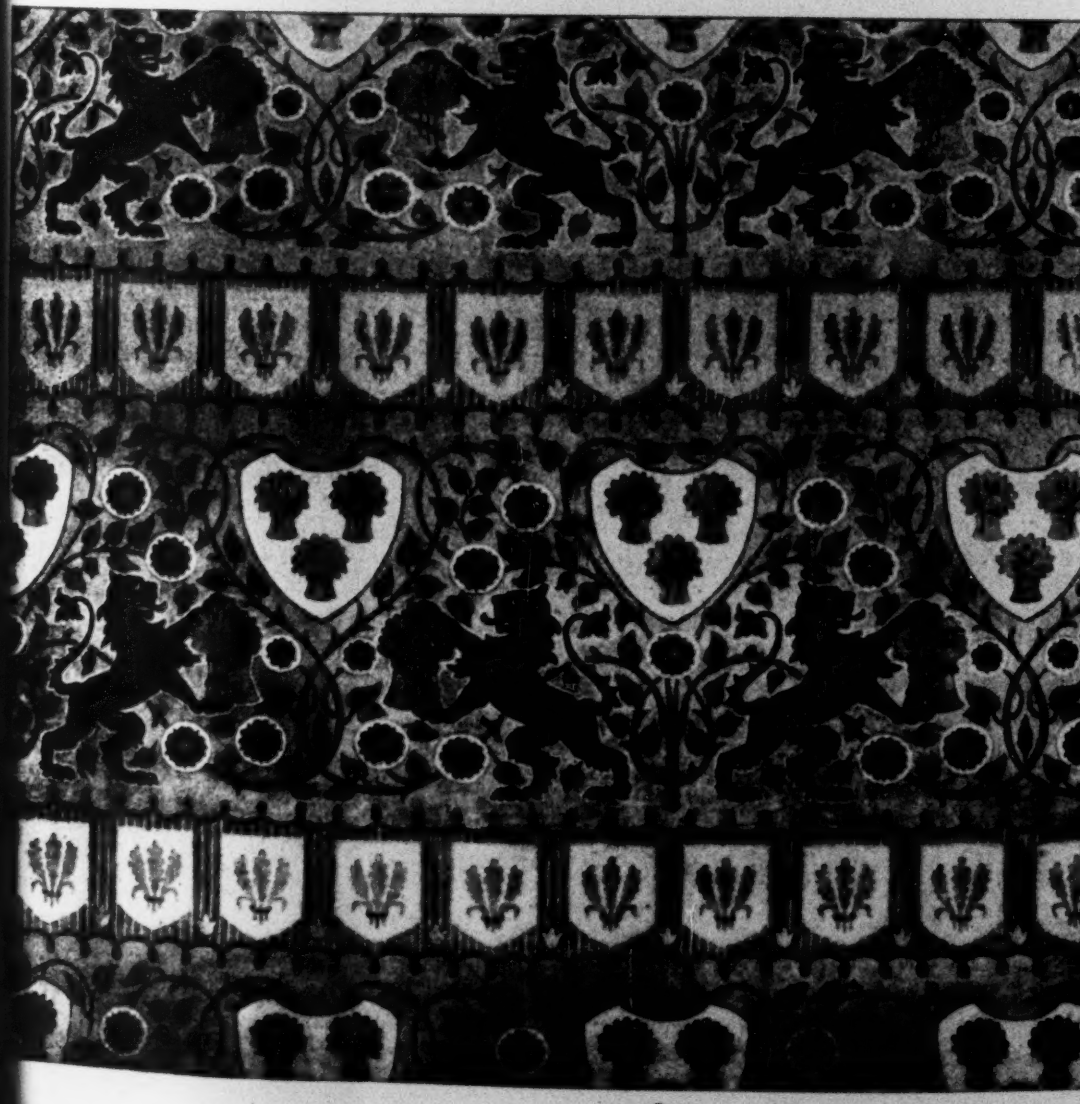

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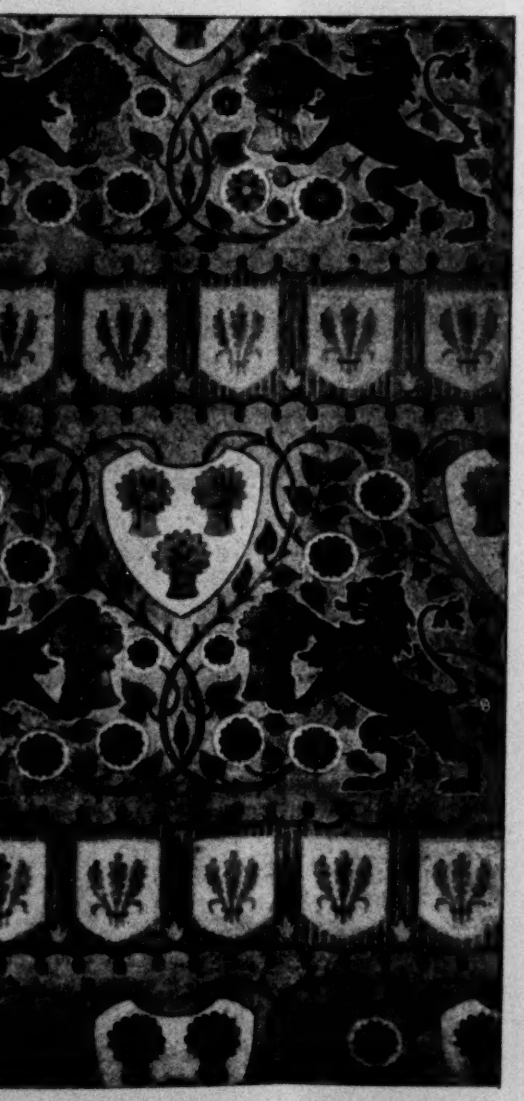

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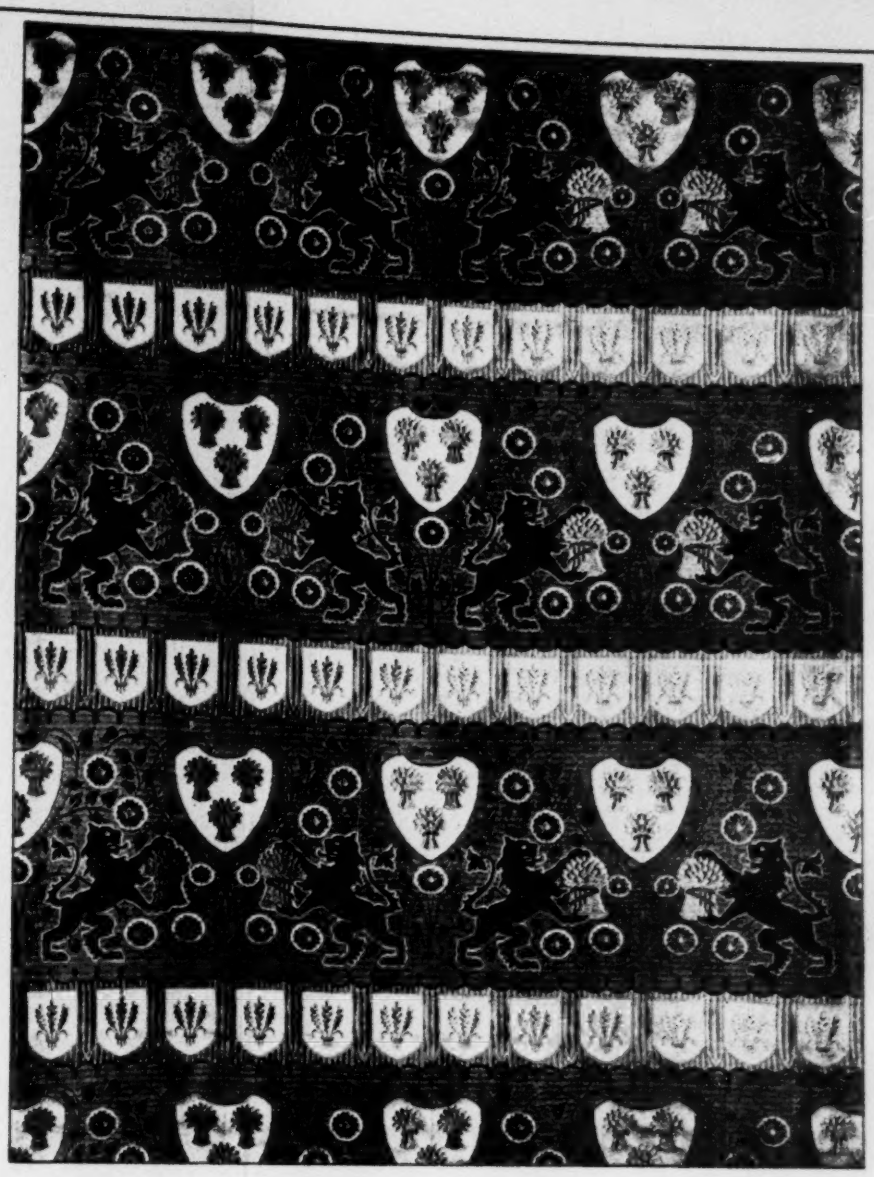

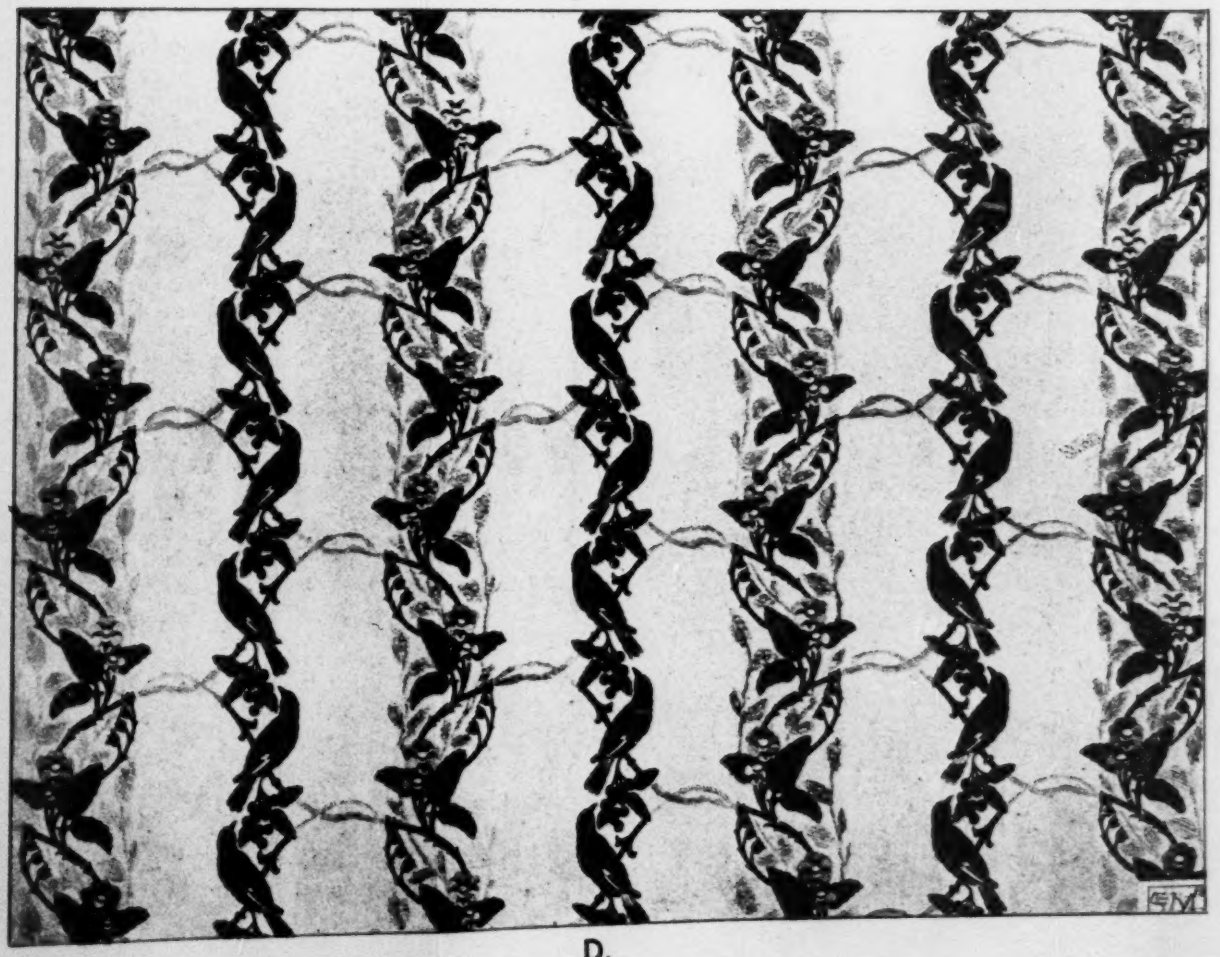

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'INK-PHOTO' SPRAGUE & Co LTD 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

NATIONAL PRIZE DESIGNS. No. 10: DESIGNS FOR FABRICS.

DESIGN FOR PLYMOUTH MUSEUM, ART GALLERY, AND FREE LIBRARY.

THE design illustrated was one submitted in the recent local competition, and the aim was to work in close conformity to the conditions laid down by the promoters, which were both full and fair. Amongst other suggestions it was urged that special care should be given to proportion rather than elaborate detail, and that the two buildings—divided by a party-wall or otherwise—were to be designed as one composition.

The interest and the difficulty to the designer lay in this latter-named condition—viz., in joining two buildings so dissimilar in their uses and accommodation to have affinity, and at the same time preserve the truthful expression to each.

In this design an equally balanced block has been contrived, with the connecting triple arcades as the central feature; it was unfortunately necessary, on the score of economy, to step the building half-way; it would have been more effective to have kept the unbroken horizontal lines from end to end.

The site with a street, back and front, is confined by large blocks of shops with dwellings over at both ends, and the conditions suggested that the buildings should cover "practically the entire frontage."

The idea of abutting this public building against the blocks at either end, when the accommodation could be obtained without it, was considered, but abandoned in favour of the altogether more practical and artistic treatment for any public building, viz., complete isolation.

The connecting arcade forms also a porch to the entrance of museum and art gallery lecture-hall on the basement floor, and the upper stages were intended for the display of that class of object of interest (or sculpture) which may with advantage be mounted in the open air, access to the upper stages being obtained from the building. In the circular panel of the top balustrading a bust of Ruskin was intended as symbolising the combination of art with literature; the other carved medallions and panels were intended to be filled by busts of those typical of the arts of architecture, painting, and sculpture for the gallery, and of literature on the library. The walls were to be of local limestone, with Devonshire granite plinth. The stipulated cost was about 28,000*l.* for both buildings.

The design was exhibited in the last Royal Academy Exhibition.

T. ROGERS KITSELL.

DESIGNS FOR FABRICS.

THESE are designs for woven fabrics submitted by students in the annual National Competition of Schools of Art under the Science and Art Department, South Kensington. Mr. Newman's designs for tapestry, A., B., and C., obtained a silver medal, as did D., by Mr. Atkin. In the one the design is horizontal in effect, in the other vertical.

They are typical of the careful way in which students are now taught applied design under the direction of the South Kensington authorities.

METROPOLITAN ASYLUMS BOARD.—At the sitting of the Metropolitan Asylums Board on Saturday a letter was received from the Local Government Board asking the managers to reconsider the proposal to provide additional accommodation for the staff at the Eastern Hospital. The Board further wrote sanctioning expenditure on the erection of an entrance lodge at Belmont, and also the expenditure on the fitting up of the discharge block at the South Eastern Hospital.——It was agreed to authorise the cleaning and distempering of the internal walls of the above institution at a cost of 286*l.*——When the Joyce Green hospital was constructed a tramway was provided connecting the various blocks with Long Reach pier so that patients could be conveyed from the steamer to the wards in an ambulance tramcar. These had proved successful, and it was recommended and agreed that four ambulance tramcars be obtained for use at the small-pox hospital.

Correspondence.

ABBEYDORE CHURCH.

SIR,—Will you allow me through the medium of your paper to make known the urgent need of this beautiful and interesting Cistercian Abbey church?

Nearly four years ago a considerable reparation was effected under the supervision of Mr. Roland W. Paul, F.S.A., architect. The entire flooring was taken up, which lay under an earthen bed rather more than a foot deep, on the surface of which were scattered human skulls and bones. These were carefully collected and sealed up. The earth having been removed, the whole area was concreted and the floor relaid as it was before. The roof of the presbytery (the most beautiful part of the church) was retiled with stone slates, boarded, and felted. Scudamore's plaster ceiling, being in a broken state, was removed, and oak boarding substituted for it behind the joists. A complete system of drainage has been carried out, and the buttresses of the eastern chapels carefully underpinned. The repair of the tower roof and battlements entailed a considerable outlay. The latter had to be rebuilt, and the old roof replaced by a leaden one. This repair alone cost over 500*l.* The entire reparation (as far as it has gone) cost just 2,000*l.*

It was intended to treat the transept roof and ceiling (for which this appeal is being made) in exactly the same way as that of the presbytery, preserving Lord Scudamore's interesting woodwork and substituting oak boarding at the back of the joists, for the present plaster ceiling, and relaying the stone slate roof on felt and boarding; but our good intentions were frustrated through lack of funds.

The transept roof, at that time very bad, is now in a most dilapidated and dangerous condition, the laths on which the tiles are nailed having rotted in numerous places, causing the tiles to slip, and leaving openings in the roof through which the rain pours in upon the plaster ceiling below.

I cannot help feeling that when it is publicly known that this portion of the church is in such a sad and dangerous condition, and—more than this—a source of danger to the repaired portion, as well as to those who pass under it, that the 1,100*l.* required will be forthcoming.

My deepest and heartfelt thanks are due to the many friends and well-wishers who have so generously responded, and enabled me to repair this beautiful Cistercian relic, so far, for the reverent worship of God. And I am emboldened to think, judging from the many who have visited and continue to visit the Abbey, that their interest in it is still keen and unflagging. The very fact alone of this Cistercian presbytery being the only one in the country used for Divine service, is sufficient to rouse the interest of all lovers of ecclesiastical architecture for this church, possessing, as it does, an interest and beauty so unique.

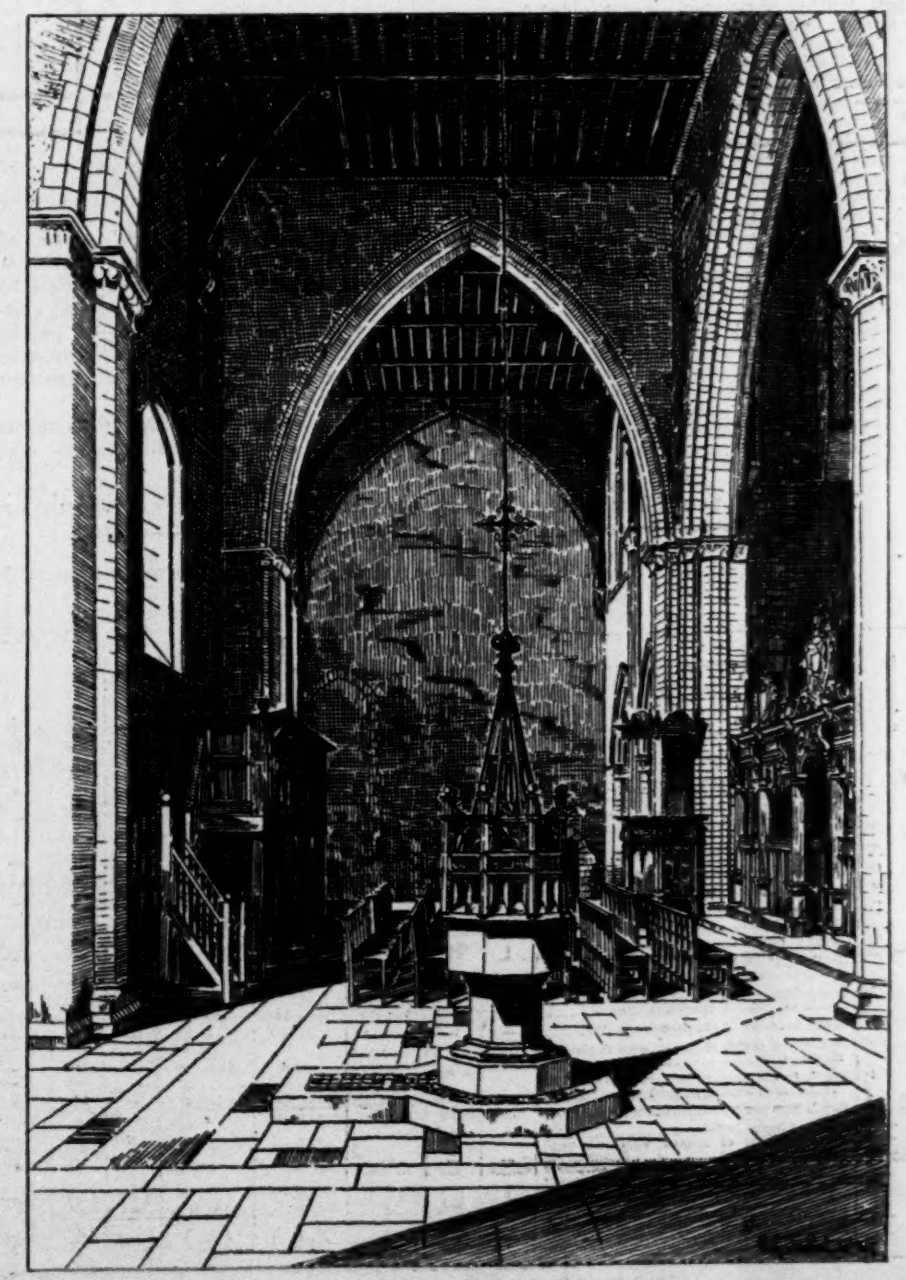
ALFRED PHILLIPS, Rector.

Abbeydore, Herefordshire.

BOOKS RECEIVED.

A SUMMARY OF THE ARCHITECTURAL MONUMENTS IN CYPRUS. Part VI. By G. Jeffery. (Government Printing Office, Nicosia, Cyprus. 4d.)

HOW TO ESTIMATE. By John T. Rea. (B. T. Batsford. 7*s.* 6*d.*)



Abbeydore Church: Interior as it will appear when the proposed repairs are completed.

Competition.

MUNICIPAL BUILDINGS, STIRLING.—The first premiated design in this competition is by Messrs. Salmon & Son & Gillespie, 53, Bothwell-street, Glasgow. The second and third respectively are by Messrs. Stewart & Paterson, 14, Blythwood-square, Glasgow, and Mr. Alexander Wingate, 151, West Regent-street, Glasgow.

Trade Catalogues.

WE have received from the Engineering Department of the National Electric Lamp Association of America three very interesting bulletins. The first, entitled "Data on Illumination," has been compiled specially for the use of architects, building contractors, and the new type of professional man called the "illuminating engineer." The data are given in a scientific manner, and are accurate. They will prove useful to all who have to study lighting problems. The second bulletin gives accurate data in connexion with tantalum lamps. It would be better if the efficiencies were expressed in candles per watt rather than in watts per candle. The curves showing the distribution of light coming from a tantalum lamp with a holophane reflector are instructive, and will be a great aid in the proper spacing of these lamps. The third bulletin discusses the tungsten street series lamp, and an illustration of a tungsten lamp for ordinary lighting is also given which was exhibited at the Chicago Exhibition. The efficiencies given for these lamps are not quite as high as those generally accepted in this country for the "osram" lamp, namely, one candle per watt. The filament of the osram lamp is an alloy consisting mainly of tungsten (wolfram), with a small quantity of osmium. These lamps, which are made in Germany, are, although only put on the market six months ago, now so largely used in this country that station electrical engineers are, in some cases, attributing the decline in their receipts to the small amount of current taken by these lamps. It is interesting to notice that the American lamp manufacturers have started making lamps with tungsten filaments, and we wish them every success.

Messrs. F. W. Reynolds & Co. send us their abridged catalogue entitled "A Few Modern Types of Wood-working Machinery." The booklet contains particulars and illustrations of circular and band saws, planing, surfacing, thicknessing, and moulding machines of different types and in various combinations, a new type of self-contained tenoning machine, and a new patent chain mortising machine. Those who do not find what they require are invited to send for sections of the firm's complete catalogue, where practically every kind of modern woodworking machinery is described.

The Student's Column.

REINFORCED CONCRETE BEAM FORMULÆ.—II.

NOTATION AND ALGEBRAICAL FORMS (*continued*).

(2.) *General Comparison of Existing Systems of Notation.*—Tables I. to IV. contain selections of symbols from the works of representative authorities and writers in Great Britain, on the Continent, and in the United States.

These tables show the diversified manner in which symbols are being applied, and illustrate graphically the arduous nature of the task before any engineer who essays the comparison of reinforced concrete beam formulæ in general, or the examination of any such formulæ other than those with which he may already be familiar.

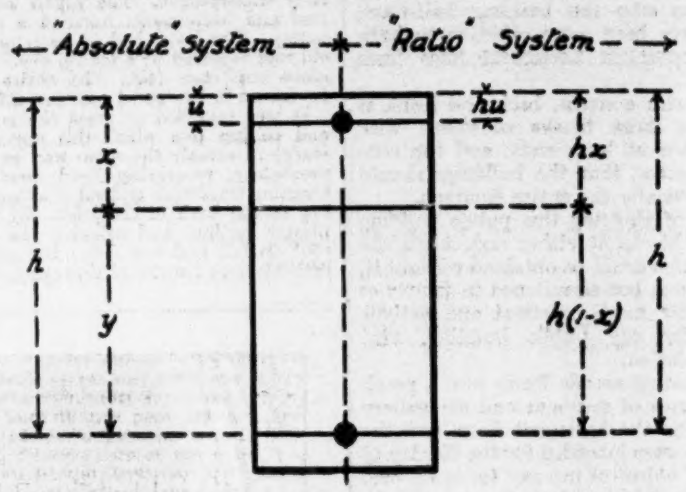


Fig. 1.

(3.) *"Absolute" and "Ratio" Modes of Expression.*—Before going into details, it should be pointed out that in addition to variations depending upon theoretical considerations and other variations of purely algebraical character, reinforced concrete beam formulæ may be divided into two classes,

In formulæ of one class certain dimensions are stated as absolute measurements, and in those belonging to the other class ratios of those absolute measurements are used.

To make clear exactly what is meant, let us refer to Fig. 1, which represents the cross-section of a rectangular beam having tension and compression reinforcement, and where commonly-used symbols are applied to certain dimensions. Here h = the distance from the top of the beam to the axis of the steel in tension, or the effective depth of a rectangular beam. On the absolute measurement system x = the depth of the neutral axis, while on the ratio system hx = the depth of the neutral axis. Hence it is obvious that $x = \frac{hx}{h}$ or the ratio of the depth of the neutral axis and the effective depth h.

It would be confusing to have two different meanings for the symbol x, and only two alternatives are open: (1) to adopt some letter, say k, instead of x in the absolute system of notation, or (2) to accept for both systems of notation the symbol hx.

If the first alternative were accepted we should have $k = hx$, which involves an unnecessary effort of memory and leads to confusion; whereas, by accepting hx for both systems the only drawback is that the symbol includes two letters instead of one letter.

The case of u and hu, the depth of the

TABLE I.—NOTATION FOR LINEAR MEASUREMENTS AND RATIOS OF LINEAR MEASUREMENTS AS USED BY VARIOUS AUTHORITIES FOR REINFORCED CONCRETE BEAMS.

(*All dimensions refer to rectangular beams except where otherwise stated.*)

*References.	Description.	UNITED KINGDOM.			FRANCE.			AMERICA.								
		R.I.B.A.	Marsh & Dunn.	Twelvetrees.	French Commission.	Considère.	Odgaet.	Bust & Hill.	Hatt.	Johnson.	Sabin.	Sewell.	Talbot.	Taylor & Thompson.	Wason.	Turneaure.
Fig. 2	Breadth of rectangular beam	b	b	b	b	l	a	b	b	b	z	b	b	b	b	b
..	Breadth of rib in T-beam	b	b	b_1	b_1	a	—	b	—	—	—	b	—	—	—	b_1
..	Breadth of flange in T-beam	b_1	N	—	b	l	a	b^1	—	—	—	—	—	b_1	—	b
—	Length between supports	l	L	l	—	—	L	—	—	—	—	$(b+2c)$	—	—	—	—
Fig. 3 (1)	Depth, total	—	d	d	h	h	H	h	h	t	h	$(d+e)$	—	h	h	—
(2)	Depth to centre of tension in steel	d	h	$(d-z)$	—	$(h-u)$	h	y	hu	(y_1+y_2)	d	d	d	d	d	d
(3)	Depth below centre of tension in steel	—	β	z	d_1	u	u	y_1	$(h-hu)$	e	i	e	—	e	e	e
(4)	Depth to neutral axis	kd	u	k_1	y_1	$(h-x)$	d	x	kx	y_1	y_1	y_1	kd	nd	$\frac{x}{nd}$	kd
(5)	Depth from neutral axis to centre of tension in steel	$(d-kd)$	$(h-u)$	kx	$[h-(y_1+d^1)]$	$(x-u)$	kd	y	$(hu-kx)$	y_2	y_2	y_2	$(d-kd)$	$d(1-x)$	y	$(d-kd)$
(6)	Depth to centre of compression in concrete	z	$(\frac{1}{3}u)$	$(\frac{1}{3}k_1)$	$(\frac{1}{3}y_1)$	—	$(\frac{d}{3})$	$(\frac{1}{3}x)$	$(\frac{1}{3}hx)$	$(\frac{1}{3}y_1)$	$(\frac{1}{3}y_1)$	$(\frac{1}{3}y_1)$	z	$(\frac{1}{3}xd)$	$\frac{x}{3}$	$(\frac{1}{3}kd)$
(7)	Depth from centre of compression in concrete to neutral axis	$(kd-z)$	y	$(\frac{2}{3}k_1)$	y_2	—	$(\frac{2}{3}d)$	—	$(\frac{2}{3}hx)$	$(\frac{2}{3}y_1)$	$(\frac{2}{3}y_1)$	$(\frac{2}{3}y_1)$	$(kd-z)$	$(\frac{2}{3}xd)$	$(\frac{2}{3}nd)$	$(kd-\frac{1}{3}kd)$
(8)	Depth from centre of compression in concrete to centre of tension in steel	—	$(h-\frac{u}{3})$	$(h_1+\frac{1}{3}k_1)$	$[h-(\frac{1}{3}y_1+d^1)]$	—	Z	—	$(hu-\frac{1}{3}hx)$	$(\frac{1}{3}y_1+y_2)$	$(\frac{1}{3}y_1+y_2)$	kd	d^1	$d(1-\frac{x}{3})$	$(d-\frac{x}{3})$	$(d-\frac{1}{3}kd)$
(9)	Depth to centre of compression in steel	—	a	—	d	u^1	—	d_1^1	—	—	k	—	—	ad	—	d^1
(10)	Depth from centre of compression in steel to neutral axis	—	$(u-a)$	—	(y_1-d)	$(h-x)-u^1$	—	t	—	—	(y_1-k)	ny_1	—	$d(x-a)$	—	$(kd-d^1)$
(11)	Depth from centre of compression in steel to centre of tension in steel	—	$(h-a)$	—	$[h-(d+d^1)]$	$[h-(u+u^1)]$	—	h^{11}	—	—	$(x+y_2)$	kd	—	$d(1-a)$	—	$(d-d^1)$
(12)	Depth from neutral axis to bottom of concrete	—	$(d-u)$	(k_1)	$(h-y_1)$	x	$(H-\frac{d}{2})$	N	$(h-kx)$	$(t-y_1)$	—	$(h-y_1)$	(y_2+e)	$[d(1-x)+e]$	$(y+e)$	—
—	Depth of flange in T-beam	d_1	D	—	e	e	E	x'	—	—	—	a	—	kd^1	—	t
—	Ratio of depth of neutral axis and total depth of beam	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—
—	Ratio of depth of neutral axis and centre of tension in steel	k	$(\frac{u}{h})$	$(\frac{kx}{h})$	$\frac{y_1}{h}$	$(\frac{h-x}{h-u})$	$(\frac{d}{h})$	$(\frac{x}{y})$	—	$(\frac{h_1}{y_1+y_2})$	$(\frac{y_1}{d})$	$(\frac{y_1}{d})$	k	x	x	$k, \frac{c}{d}$
—	Ratio of depth of centres of compression and tension in steel	—	$(\frac{a}{u})$	—	$(\frac{d}{h-d^1})$	$(\frac{u^1}{h-k})$	—	$\frac{d_1^1}{y}$	—	—	—	—	—	—	—	$(\frac{d^1}{d})$

* The Reference Numbers in the margin of this table will be used in the next article, where also Figs. 2 and 3 will be introduced.

axis of compression in the steel, when that axis is not coincident with the axis of compression in the concrete, is on all fours with the case of x and hx, and requires no separate comment.

Turning now to y and $h(1-x)$, we see that both of these are absolute measurements. The symbol y is suitable for use in one class of formula, but for the other class the ratio, $\frac{h-hx}{h} = (1-x)$, is required, and if two codes of notation were adopted we should have to remember that $y = h(1-x)$.

Notwithstanding the apparent complication of the expressions hx, hu, and $h(1-x)$, as compared with their equivalents x, u, and y, the fact is that the three first are more readily understood and borne in mind because they convey a distinct impression of certain relations to h, and two of them, x and $(1-x)$, indicate relations between the symbols themselves.

On the contrary, x, u, and y express no relation either to h or to each other, and, being purely arbitrary, cannot be so easily borne in mind except by the habitual users of a particular formula wherein they may have been adopted.

Moreover, in practice it will be found that the ratio method of dealing with measurements is really less complex than the absolute measurement system, because the use of ratios has the effect of simplifying calculations, leaving the factors representing main values to be qualified by the resultant of two, three, or more ratios each of simple character, whereas when absolute measurements and values are employed throughout an equation, the mathematical treatment of the factors involves greater labour.

General Building News.

SLALEY CHURCH, NORTHUMBERLAND.—This church has just been reopened by the Bishop of Newcastle, after having been renovated and restored. The gallery and plaster ceiling have been removed, new flooring and mosaic have been laid, and the seating has been renewed throughout, and a beautiful memorial oak pulpit has been presented. The chancel screen and fittings are all in oak. The vestry has been enlarged, and a porch and buttresses have been added. A system of drainage and new heating apparatus have been supplied. The whole work has been designed and supervised by Mr. A. B. Plummer, the Diocesan Architect, Mr. Civil, of Hexham, being the contractor.

ROMAN CATHOLIC CHURCH, SLOUGH.—The Roman Catholics of this town are about to have a new church erected on a site in Curzon-street. Mr. Benedict Williamson, architect, is preparing plans for the proposed building,

TABLE II.—NOTATION FOR SECTIONAL AREAS AND RATIOS OF SECTIONAL AREAS AS USED BY VARIOUS AUTHORS FOR REINFORCED CONCRETE BEAMS.

(*All dimensions refer to rectangular beams except where otherwise stated.*)

	UNITED KINGDOM.			FRANCE.			AMERICA.								
Description.	R.I.B.A.	Marsh & Dunn.	Twelvetrees.	French Commission.	Considère.	Coignet.	Buel & Hill.	Hatt.	Johnson.	Babin.	Sewell.	Talbot.	Taylor & Thompson.	Wason.	Turneaure.
Area, total	—	(bd)	(bd)	(Ω_0)	(bk)	(aH)	A	(bh)	(bt)	(zh)	$[b\ (d+e)]$	—	(bh)	(bh)	—
Area above centre of tension in steel	A	(bk)	$[b\ (d-z)]$	—	$[b\ (k-u)]$	(ah)	—	—	$[b\ (y_1+y_2)]$	(zd)	(bd)	(bd)	(bd)	(bd)	(bd)
Area above neutral axis	A_c	(ba)	(bh_1)	(by_1)	$[b\ (k-x)]$	(ad)	(bx)	(bhx)	(by_1)	$(-y_1)$	(bn_1)	(bkd)	(bxd)	(bxd)	(bkd)
Area of flange of T-beam	b_1d_1	(BD)	—	(be)	(be)	(aE)	(b^1e)	—	—	—	$[(b+2z)\ s]$	—	(b^1A^1)	—	(bf)
Area of steel in tension for single reinforcement	A_1	a	a	Ω_a	f	s	A_s	(pbh)	a^2	a	(ab)	A	(pbd)	A	A
Area of steel in tension as for single reinforcement	—	a_1	—	—	—	—	—	—	—	a	—	—	—	—	—
Area of extra steel in tension for double reinforcement	—	a_2	—	—	—	—	—	—	—	A	—	—	—	—	—
Area of total steel in tension for double reinforcement	—	a_1	—	—	—	—	—	—	—	$(a+A)$	—	—	—	—	—
Area of steel in compression for double reinforcement	—	a_c	—	—	f^1	—	A^1_s	—	—	A^1	A^1	—	(p^1bd)	—	A^1
Ratio of steel in tension for single reinforcement	p	ψ	ρ	—	—	—	—	p	—	—	—	p	p	p	p
Ratio of steel in tension as for single reinforcement	—	ψ_1	—	—	—	—	—	—	—	—	—	—	—	—	—
Ratio of extra steel in tension for double reinforcement	—	ψ_2	—	—	—	—	—	—	—	—	—	—	—	—	—
Ratio of total steel in tension for double reinforcement	—	ψ	—	—	—	—	—	—	—	—	—	—	—	—	—
Ratio of steel in compression for double reinforcement	—	$\gamma\psi$	—	—	—	—	—	—	—	—	—	—	p^1	—	p^1

TABLE III.—NOTATION FOR STRESSES AND STRAINS AS USED BY VARIOUS AUTHORITIES FOR REINFORCED CONCRETE BEAMS.

	UNITED KINGDOM.			FRANCE.			AMERICA.								
Description.	R.I.B.A.	Marsh & Dunn.	Twelvetrees.	French Commission.	Considère.	Coignet.	Buel & Hill.	Hatt.	Johnson.	Babin.	Sewell.	Talbot.	Taylor & Thompson.	Wason.	Turneaure.
Compressive stress intensity in concrete	c	c	f_c'	R_b	R_c	r	f_c'	c	—	f_c, f_c	F	c	C	c	f_c
Compressive stress intensity in steel	—	f_c	f_c'	R_a	R_c'	—	f_s'	—	—	f_c'	—	—	S	—	f_s
Tensile stress intensity in concrete	—	t	f_t'	—	R_t	—	f_{ct}	t	—	—	—	—	T	t	—
Tensile stress intensity in steel	t	f_s	f_t''	R_s'	R_s	R	f_s	f	—	f_s	T	f	S	f	f_s
Compressive strength of concrete	—	—	F_c'	—	—	—	—	—	f_c	—	f_c	—	—	c	—
Tensile strength of concrete	—	—	—	—	—	—	—	—	—	—	f_t	—	—	t	—
Elastic limit of steel	—	—	e	—	—	—	—	—	F	—	f_s	—	—	f	—
Deformation of concrete in compression	—	—	λ'	—	—	—	—	—	λ_1	λ_1	λ_1	e_c	—	—	ϵ_c
Deformation of steel in tension	—	ϵ	λ''	—	—	—	—	—	λ_2	λ_2	λ_2	e_s	—	—	ϵ_s

TABLE IV.—NOTATION FOR COEFFICIENTS AND MOMENTS AS USED BY VARIOUS AUTHORITIES FOR REINFORCED CONCRETE BEAMS.

	UNITED KINGDOM.			FRANCE.			AMERICA.								
Description.	R.I.B.A.	Marsh & Dunn.	Twelvetrees.	French Commission.	Considère.	Coignet.	Buel & Hill.	Hatt.	Johnson.	Babin.	Sewell.	Talbot.	Taylor & Thompson.	Wason.	Turneaure.
Coefficient of elasticity of concrete in compression	E_c	E_c	E_c'	E_c	E_c	E_c	E_c	E_c	E_c	E_c	E_c	E_c	E_c	E_c	E_c
Coefficient of elasticity of concrete in tension	—	—	E_t'	—	—	—	—	E_t	—	—	—	—	E_t	E_t	—
Coefficient of elasticity of steel	E_s	E_t	E_t''	E_s	E_s	E_s	E_s	E_s	E_s	E_s	E_s	E_s	E_s	E_s	E_s
Ratio of E for concrete in compression and E for steel	m	m	m	m	n	n	e	$\frac{1}{r}$	—	R	$\frac{1}{r}$	n	r	n	n
Bending moment	M	M	M	M	M	M	M	$\frac{1}{r}M$	M	M	M_1	$\frac{1}{r}M$	M_B	$\frac{1}{r}M$	M
Moment of resistance	—	M	R	—	—	—	—	M	M_c	M_c	M_2	M	M_B	M	M

which will consist of a chapel, nave and aisles, lady chapel and sacristies, and an embattlemented tower, surmounted by a spirelet. Seating accommodation is to be provided for 600 people.

CHURCH IMPROVEMENTS, HARDINGSTONE.—At the Parish Church of Hardingstone some improvements have been carried out in the chancel by Mr. H. Martin, from the designs and under the superintendence of Mr. H. M. Scrivener, architect.

NEW CHURCH, FARNHAM COMMON.—The Lord Bishop of Oxford recently consecrated a new church which has been erected at Farnham Common to St. John the Evangelist. It has been erected to the design of Mr. Charles Ford Whitcombe, architect, of London, and is built of brick with Bath stone facings. Seating accommodation is provided for about 250 persons.

PARISH CHURCH, OXFORD.—The new parish church of St. Andrew, in the Linton-road, was recently opened. The church, which seats some 650 persons, was designed by Mr. A. R. G. Fenning, architect. The whole building is 125 ft. in length, the nave is 29 ft. 3 in., while the apse at the east end is 26 ft. in width. The total width of the whole building is 56 ft., and the height to the apex of the vaulting is 38 ft. The exterior is of Monk's Park stone, and the slating of Welsh green.

CHURCH, SPENCERS WOOD, SHINFIELD.—The foundation-stone has been laid of a new church at Spencers Wood, near Shinfield. The building will, when complete, consist of nave, chancel, vestry, and south porch, with sitting accommodation for 280 persons, but at present only a portion of the nave is being built. The architect is Mr. S. Slingsby Stallwood, of Reading, and the builder Mr. Chas. Aldridge, of Spencers Wood.

NEW CHURCH, HARROGATE.—The first completed portion of the new church of St. Wilfrid, Harrogate, was dedicated on the 4th inst. by the Bishop of Knaresborough. Mr. Temple Moore is the architect of the new building, and his plans provide for a church to accommodate a congregation numbering about 900, with nave and side aisles, transepts, choir and side aisles, and Lady chapel beyond, also a tower and spire. The cost, not including the tower and spire, is estimated at 24,000*l.*; and, so far, something like 11,000*l.* has been expended in building and furnishing the nave, and a temporary extension eastwards, which together form the portion just dedicated as ready for use. For the present the altar is stationed at the west end, where the baptistery will probably be. The ornaments thereon have been made by the Artificers Guild of London. The stone used in the work comes from Tadcaster, and the contractors are Messrs. T. Rawling & Son, of York.

SECONDARY SCHOOL, WATERFOOT.—A new secondary school and technical institute is to be erected on the Millerbarn site, Waterfoot, from plans prepared by Mr. Littler, the County Architect. The cost of the new building will be about 26,000*l.*, and its erection is to be proceeded with immediately.

INFANTS' SCHOOL, BEDLINOG.—A new infants' school has been opened at Bedlinog. The building is designed on the central-hall principle, with three classrooms, a cloakroom, and a head teachers' room. The walls are of local stone with Ruabon and Forest of Dean stone dressings. The work was designed and carried out under the supervision of the County Architect, Mr. D. Pugh Jones, Cardiff, at a cost of 2,886*l.*, the contractor being Mr. D. W. Davies, of Cardiff. The clerk of the works was Mr. Tom Jones, Hengoed.

COUNCIL SCHOOL, LOSTOCK HALL.—A new mixed and infant Council school has been built at Lostock Hall at a cost of 5,195*l.* It is arranged on the central-hall plan, possessing two central halls with classrooms ranged around them, and the total accommodation is 302 in the mixed department, and 198 in the infant section. In addition, cookery and laundry rooms are provided on an upper floor. The building is faced with Accrington brick, and slated with Velinheli Welsh slate. The floors are of pitch-pine planks. The heating is on the low-pressure system, and the ventilation is on the natural system. The contractors are Messrs. R. Dewhurst & Son, Preston, and the plans have been drawn at the offices of the County Architect, Preston.

BOYS' SCHOOL, DARLINGTON.—The new boys' school in Corporation-road, Darlington, has now been opened. It has been erected at a cost of 5,500*l.* from plans prepared by Mr. George Winter, Borough Surveyor, and will accommodate 420 boys. The contractors were Messrs. Guthrie & Son; for the heating and electric lighting, Messrs. Sykes & Co.; and for the painting, Mr. F. G. Mountford.

COUNCIL SCHOOL, NEVILLE'S CROSS.—The Education Committee of the Durham County Council have erected a new school at Neville's Cross, Durham. The building was designed by Mr. W. Rushworth, Architect to the Durham County education authority, and will accommodate 264 children. The contractors for the new school were Messrs. Robson & Son, of Esh Winning, and the clerk of the works was Mr. H. W. Bulmer. The total cost was about 4,500*l.*

ROMAN CATHOLIC SCHOOLS IN CRISPIN-STREET, LONDON.—New schools are about to be erected by the Sisters of Mercy in Crispin-street. The building will be of red brick faced with stone. It will consist of a basement which will be used as a covered playground, ground floor, and two stories. Accommodation will be afforded for 192 children, mixed and infants. The architect is Mr. W. P. Ryan, and the builders Messrs. Patman & Fotheringham, Ltd.

BOARD SCHOOL, ONCHAN, ISLE OF MAN.—New buildings have been added to the Onchan Board Schools. The additions consist of two classrooms, with accommodation for 110 children, cloakrooms for boys and girls, and bookroom. Messrs. G. & W. R. Kay designed the improvements, and the work was carried out by Mr. W. J. Fargher, the total amount involved being about 1,000*l.*

SECONDARY SCHOOLS, YARDLEY.—Plans have been accepted by the Worcester County Council for a new secondary school which it is proposed to erect on a site at Tyseley, Yardley. The school, which is expected to cost the ratepayers from 14,000*l.* to 16,000*l.*, will provide accommodation for 400 pupils. It has been designed by Mr. Arthur Harrison, of Birmingham, on the central-hall principle, and will have the following capacity, viz.:—Assembly-hall, to contain the full number of students; eleven classrooms providing space for thirty, and two accommodating thirty-five students each; chemical and physical laboratories (on the ground floor), lecture-room, headmaster's room, and library; rooms for domestic science and manual instruction, dining-room, common-rooms for the teachers, a gymnasium, cloak-rooms, etc., and lock-up stores for bicycles.

GRAMMAR SCHOOL EXTENSIONS, ORMSKIRK.—The extensions to the Ormskirk Grammar School have just been opened. The school buildings as completed provide accommodation for 223 mixed scholars. The existing portion has been converted into a suite of rooms for the demonstration of physics and chemistry, the large schoolroom being a chemical laboratory. The new school, which forms a considerable extension to the buildings, has been planned with a central hall, which is carried up two stories, the classrooms on the first floor being entered from a balcony. The ground floor contains central hall, five classrooms, etc., and lavatories and cloak-room for boys and girls. The upper floor contains four classrooms and a room for advanced art, cookery classroom with scullery and store, library, upper central hall, and room for female staff. The cost of the whole of the extensions, exclusive of furniture, has been 5,850*l.* The architect is Mr. Frank Rimmington, of Liverpool, and the contractor for the work is Mr. James Whittle, of Ormskirk.

ELEMENTARY SCHOOL, LEIGH.—A new Council school for infants has been erected at Leigh-on-Sea. The building provides accommodation for 250 children. The classrooms are heated by hot water, and paved with wood blocks. The cost was 3,170*l.*, and the plans for the work were prepared by Mr. Adams, architect.

CONGREGATIONAL SCHOOLROOM, BULVERHYTHE.—The memorial-stone for a new school-hall at Bulverhythe Congregational Mission Church was recently laid. The building, like the chapel, will be of red brick with cement dressings. The work is being carried out, under the direction of Mr. T. W. Elworthy, architect, by Messrs. Eldridge & Cruttenden, builders.

PARISH HALL, HERNE.—The foundation-stone has just been laid of a parish hall, which is being built at Herne, from designs by Mr. R. Messenger, architect, by Mr. Gates, builder. The structure will be carried up to window height in red brick, and finished in rough-cast to eaves, with tiled roof, and will consist of a hall and two retiring-rooms.

NEW BUSINESS PREMISES, BELFAST.—A new oyster and fish saloon has been opened by Mr. John Rooney in Winecellar Entry, High-street. The building work was carried out by Messrs. Jas. Hogg & Son, contractors, Belfast, from the designs of Mr. J. J. M'Donnell, J.P., architect. The contractor for plumbing and gasfitting work was Mr. John M'Cullough; for electric wiring and lamps, Messrs. M. Curran & Co.; and for painting and decorating, Mr. James M'Cormick.

MAIDSTONE ELECTRICITY WORKS.—The inauguration has just taken place of new plant and extensions to these works. The extensions include additions to the boiler-house and engine-room buildings, to contain the new plant. This comprises a complete installation of mechanical stokers of the underfeed type fitted to each of the four boilers, and a complete water purifying and measuring plant, dealing with the water as it is returned from the condensers. In the engine-room, which has been lengthened by some 35 ft., has been installed a new steam dynamo of 500-kilowatt capacity, but capable of working at 625 kilowatts for two hours continuously. The engine is a three-cylinder triple-expansion high-speed engine, and runs at 300 revolutions per minute. The switchboard gallery has been extended. A new condensing plant to deal with the steam from the new set has also been installed, and both the circulating and pumps for this are driven by electric motors. The contractors for the various plant were:—Builders, G. E. Wallis & Sons; engine, Belliss & Morcom; dynamo, Dick, Kerr & Co.; stokers, the Underfeed Stoker Company; water purifier, the Harris Patent Feed Water Filter Company; condensers, the Mirlees, Watson Company; switchboard, Drake & Gorham. The extensions were designed by and carried out under the direction of the Borough Electrical Engineer, Mr. E. E. Hoadley.

WAREHOUSE, WORTHING.—Messrs. Jordan & Co. have erected a new depository in Chatsworth-road, Worthing. The warehouse is constructed of red bricks, with slate roof, and is four stories high. Mr. Hunt (Messrs. Wenban Smith & Co.) was the architect.

PROPOSED EXTENSION OF FIRE-STATION, LEICESTER.—Mr. Edgar Dudley, F.S.I., Local Government Board Inspector, held, on the 20th ult., an inquiry at the Town Hall into the application of the Leicester Town Council to borow 1,784*l.* for the purchase of property in Colton-street for the extension of the fire brigade station. The Borough Surveyor, Mr. E. G. Mawbey, gave formal evidence as to the preparation of plans.

NEW HIPPODROME, SHEFFIELD.—A new Hippodrome has been opened in Cambridge-street, Sheffield. The building will accommodate in the stalls about 380 people, and in the pit 800. On the first floor is the dress circle, with a seating capacity of 550, and eight private boxes. The gallery on the top tier will hold 1,000 people. The architect is Mr. B. Crewe, of London, and the general contractors Messrs. J. Parkinson & Son, Ltd., Blackpool.

THEATRE, METHIL.—A new theatre of varieties has been erected at Denbeath, Methil. The building, which was designed by Messrs. J. D. Swanson & Syme, Kirkcaldy, has been erected on the cantilever principle, and has accommodation for from 1,500 to 1,600 persons.

BRANCH LIBRARY, BELFAST.—The second of the three branch libraries which are being provided for Belfast through the generosity of Dr. Andrew Carnegie has just been opened. The building occupies a site in the Falls-road, and is of red brick, dressed with Scotch freestone from the Hunter's Hill quarries. The general contract has been carried out by Messrs. Courtney & Co. The modelling of the sculptured spandrils over the arches at the entrance was designed by Miss Praeger, of Holywood, and was carved under her supervision by Mr. Winter. The heating and ventilation of the building were entrusted to Messrs. Musgrave & Co., Ltd., while the mosaic floors were laid by Rust's Vitreous Mosaic Company, London. The whole of the works have been carried out from the designs and under the supervision of the architects, Messrs. Graeme-Watt & Tulloch, who were successful in winning the competition for the three Carnegie Branch Libraries.

CLUB PREMISES, SLOUGH.—The new Conservative and Unionist Club, Slough, has secured premises in High-street, and the alterations and decorations necessary have just been completed by Mr. John Deverill, the contractor, under Messrs. Lee & Farr, architects.

BUILDING IN BELFAST DURING THE PAST YEAR.—The hope entertained in the early part of the year that business would be brisk was to a considerable extent realized, for although matters at present are a little dull, due, no doubt, to a recent material advance in the price of commodities, the trade during the greater portion of the year under review fully maintained the marked improvement that had characterised 1906, which, it may be recollected, was the busiest twelve months experienced by builders since the "boom" a good many years ago. This state of affairs is largely attributable to the phenomenal success which has attended the linen industry during the past two years, for the majority of the more important contracts were for the extension or alteration of spinning mills and weaving factories. With regard to residential buildings, this branch of the trade has not been quite so good as in previous years, and especially does this statement apply to small house property. So far as villa residences in the suburbs are concerned, comparatively few of these have been built during the year, but builders are hopeful that in the course of the ensuing spring

and summer trade in this direction will become much brighter. Perhaps the main event of the year was the completion of the Municipal Technical Institute, which, apart from its equipment, has cost about 100,000*l*. Another important contract last year was the erection of new engineering laboratories, chemical theatre, etc., at the Queen's College. During the past few months the trade has been somewhat handicapped by a substantial increase in the price of practically every commodity utilised, but builders are not without hope that before long this drawback will be removed, and that the year now entered upon will be one of the most remunerative they have experienced for some time.—*Belfast News-Letter.*

OFFICES, SHEFFIELD.—New offices have been erected for Messrs. Vickers, Sons, & Maxim in the Brightside district. They comprise a block of buildings, about 300 ft. long, and five stories high, including the basement., and were designed by Mr. A. F. Wilson, of Sheffield.

WORKMEN'S INSTITUTE, ROWLAND'S GILL.—A new institute has been erected at Rowland's Gill by the Priestman Collieries Company, for the use of their workmen. The building has been erected by Mr. W. G. Armstrong, contractor, Blaydon, from the designs of Mr. A. M. Hedley and Mr. H. A, Ridley.

CLUB PREMISES, HEREFORD.—Premises standing at the junction of Friar-street and Eign-street have been converted into a men's club. The necessary alterations were carried out by Mr. E. W. Wilks, builder, and Messrs. Groom & Bettington were the architects.

Sanitary and Engineering News.

THE FILTRATION OF EDINBURGH WATER.—For some time the question of the filtration of the water supply of the Edinburgh and District Water Trust undertaking, in view of the greatly increased supply which has been introduced into the city, has been engaging the attention of the Trust, and the question of mechanical filtration, as opposed to the old system of sand filtration, has been brought prominently forward. Before committing the Trust to a very large expenditure, the trustees resolved, some time ago, to appoint the Chairman of the Works Sub-Committee (Bailie Forrest) to examine into the whole subject, and report to the Trust. In order to have the work as thoroughly done as possible, the sub-committee and the Trust have had before them reports of the different systems in use from several places where these are in operation, and a sub-committee has been appointed to visit places where one or other of the systems are in operation. The towns which are to be visited include Manchester, Crewe, Buxton, Bolton, Harrogate, Halifax, York, Gloucester, Hastings, Banbury, etc. The deputation will leave Edinburgh on January 14.—*Edinburgh Evening News.*

Foreign.

FRANCE.—The Saint-Lazare prison, shortly to be demolished, will be rebuilt in the Quartier Javel of Paris (XVth arrondissement).——M. Guet, Government Architect, has been elected President for 1908 of the Société des Architectes Diplomés of the Ecole Speciale d'Architecture.——A new Normal school for girls is to be built at Saint Germain-en-Laye.——M. Gréber, the sculptor, has been commissioned to execute a monument to Rousseau, to be erected at Ermenonville.——A new bridge is to be built over the Meuse at Saint-Mihiel, at a cost of 20,000 francs.——The fortifications of Rochefort-sur-Mer are to be demolished, and the land will be purchased by the Municipality for 386,000 francs, to be relet in building lots.——The École Vaucanson, at Grenoble, is to be rebuilt on the Boulevard Gambetta, at a cost of 981,000 francs.——M. Planckaert, architect, of Limoges, who obtained the commission for the museum at Bayonne in a competition, has been instructed to carry out a new wing to the museum to receive the collection of works left by M. Bonnat to his native town.——The Government have decided that the objects of art which are in the Archbishop's palace, the seminary, and other religious buildings at Avignon, are to be arranged in various rooms in the ancient Palace of the Popes, which is to be the Art Museum for the Department of Vaucluse.——On the proposal of M. Léonce Bénédite, curator of the Luxembourg, a museum of painting and sculpture is to be organised at Algiers.——The Municipal Council of Paris have decided that M. Moncel's sculpture, "Le Rêve du Poète" (of which an illustration has appeared in the *Builder*), is to be erected in the Champs Elysées, behind the Grand Palais, near the Cours la Reine.——The death is announced, at the age of 69, of a talented painter, M. C. Hermann Léon, a pupil of Fromentin and of Philippe Rousseau. He was a member of the Société des Artistes Français, where he exhibited last year two works, "Première Vision" and "Le Lièvre." He excelled specially in animal painting, or pictures in which animals were prominent, as in his "Actéon" (in the museum at Morlaix); "Hallali Courant," at the Ministry of the Interior; and other works of the same class. He had received medals at two Salons, and the Cross of the Legion of Honour in 1897.

GERMANY.—The Hamburg Elbe tunnel, which is to take the place of a bridge and convey the passenger and vehicular traffic between St. Pauli landing-stage and Steinwärder, has recently been put in hand. Two shafts of 22 metres diameter will lead down to two tunnels of 6 metres diameter, each taking the traffic in one direction only. The shafts will contain six lifts, four for vehicles, two for passengers, and two iron staircases. The tunnels will be 120 metres long, and the crowns will rise to about 6 metres under the river bed. The work will take about two and a half years to complete, and will cost 12·25 million francs.——The German Concrete Company have been making experiments in the Stuttgart Testing Institution, to ascertain what admixture of water will produce the best results in concrete. The experiments prove that the minimum quantity of water that gives a mixture as damp as earth produces the most satisfactory results. The experiments were extended to ferro-concrete, and it was found that the same consistency of concrete offered the most resistance to the withdrawal or pressure of the iron rods.——The German artists of the new movement, headed by the architect, Herr T. Fischer, of Stuttgart, together with the representatives of many leading firms, have lately founded in Munich a society of German Arts and Crafts. The object of the society is to raise the standard of work, to elevate the understanding of the masses in purity of style, and to diffuse the knowledge of good work in the widest circles. The chief methods by which these aims will be attained will be, literary explanations of the conditions under which the best work can be produced, organisation of arts and crafts exhibitions, improved schooling for the craftsmen, artistic and technical education for the designers, and a crusade waged against mediocre productions as constituting stumbling-blocks to the advance of culture.

AUSTRIA.—The three artists, MM. Edmond Klotz, Christian Plattner, and Hans Perathoner, who were awarded premiums in the Speckbach Memorial Competition, have been invited to compete against each other in a limited competition, the designs to be submitted by July 1, 1908.

ITALY.—Important restorations are in course of execution in Sta. Maria degli Angeli, Lugano, where is to be found Luini's masterpiece, the famous fresco of the Passion dating from 1529. Not only is the façade overhanging 17 centimetres, this being caused by the pressure exerted by the Hotel du Parc which has been built up against the south wall, but dangerous cracks have opened up both on the façade wall and on the wall bearing the fresco, caused by the damp emanating from the lake near by. The work of restoration is being carried out by the architect Zanini. The restorations to the cathedral in the same town, which include those to the roof, are being carried out by Messrs. Giudini & Marsini.——The Societa Anonima di Navigazione Interna has been formed in Milan to promote inland water-borne traffic between Venice and Milan. Of the 2,000,000 tons of merchandise landed yearly at Venice from the sea, 1,000,000 tons is water-borne towards the interior. When the new canals have been opened this traffic will be greatly increased, as all of the larger towns of the Po Valley, Parma, Bologna, Modena, Mantua, Sosi, Cremona, etc., will be connected to Venice. The canals which connect Pavia, Milan, the lakes of Como and Maggiore with the Po will also be enlarged, as at present they are only navigable for ships of 100 tons. These canals will greatly lessen the strain on the Genoa-Milan railways, which have reached the limit of their carrying power.

SWITZERLAND.—The painters, MM. Albert Welti, of Munich, and Wilhelm Balmer, of Florence, have been commissioned conjointly to decorate in fresco the south wall of the Diet-room, Berne. Herr Welti suggests as a suitable subject for the picture The National Council, meeting in the open, with a landscape as background.

RUSSIA.—Last September the Sutschan Railway, in the province of Usuri, was opened for temporary traffic. This branch line consists of a funicular, a narrow gauge, and a broad gauge, with a total length of 32 kilometres. The funicular carries the coal from the colliery to the narrow gauge, which supplies the broad gauge line. The latter joins the main Usuri line at Verst, 32 kilometres from Nadeschdinskaja, and is under the management of the Chinese Eastern Railway Company, which a year ago took over the Usuri line, and proposes, by way of trial, running suburban trains between Vladivostok and Nadeschdinskaja.

Miscellaneous.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—Mr. George Elkington, architect, 7, Laurence Pountney-hill, has taken into partnership his son, Mr. Geo. Leonard Elkington. This makes no difference in the style of the firm, which has stood as "George Elkington & Son" since the decease of the late Mr. Elkington.

"VIENNA ARCHITECTURE."—On page 12 of our article of last week there was a misprint of "stone" for "stucco" which escaped notice. What we meant to say was that "the old lime stucco buildings had a certain character," and that they were "obviously stucco," not "obviously stone" as printed.

TESTS OF FIRE EXTINGUISHERS.—A report issued this week by the British Fire Prevention Committee gives the results of tests made with the object of ascertaining the effect of the "New Era" chemical fire extinguisher upon various burning materials, such as bedroom draperies, hay, straw, paper, rags, shavings, woodwork, oily rags and cotton waste, packing-cases, celluloid, and petrol. The tests are described at considerable length, but the results may be thus briefly summarised:—The extinguishers were uniformly efficient in checking small fires in the initial stage, whether applied by persons experienced or inexperienced in their use. In several cases one appliance was able to extinguish small fires completely. Where the burning material was soft and loose some difficulty was found in stopping the smouldering which followed the extinction or partial extinction of flame. Petrol fires were extinguished in cases where the area of the spirit was not greater than that covered by the spray from the apparatus, and in long, narrow vessels where the spray could be skilfully directed so as to lift the flames from the liquid progressively. This investigation, which was evidently conducted with much care, confirms the teaching of previous experience that chemical fire extinguishers are of real value during the early stages of small outbreaks of fire, and in retarding the progress of small fires that cannot be extinguished by appliances of the same class.

KEIGHLEY BUILDING BY-LAWS.—The Keighley Corporation is promoting a Bill in Parliament which contains, amongst other things, powers to improve the by-laws regarding streets and buildings. By clause 38 it is provided that in every public building and in every other building of more than 50,000 ft. in cubical extent, and which is to be used for dwelling purposes or for offices, the floors of all lobbies, corridors, etc., the flights of stairs, and the walls enclosing such stairs shall be of fire-resisting material, and carried by supports of fire-resisting material. The following materials are for the purposes of the section deemed to be fire-resisting materials:—For stairs and landings, oak, teak, jarrah, karri, or other hard timber, the treads, risers, strings, and bearers being not less than 1¾ in. thick, and the ceilings and soffits being of plaster and cement; (2) oak, teak, jarrah, karri, and other hard timber when used for beams or posts or in combination with iron, the timber and iron (if any) being protected by plastering or other incombustible or non-conducting external coating not less than 2 in. in thickness, or, in the case of timber, not less than 1 in. in thickness on iron lathing; (3) in the case of floors, brick, tile, terra-cotta, or concrete composed of broken brick, tile, stone, chippings, ballast, pumice, or coke breeze and lime cement, or calcined gypsum not less than 5 in. thick in combination with iron or steel; (4) in the case of material partitions enclosing staircases and passages, terra-cotta brickwork, concrete or other incombustible material not less than 3 in. thick; (5) any other material from time to time approved by the Corporation as fire-resisting.

PROPERTY SALES.—Steventon Manor-house estate, near Basingstoke, is placed in the market. It comprises some 1,600 acres, with farms, schools, and cottages, and the ownership is traced from Henry III.'s day, when it vested in the de Roche family. The late possessor bought the property from the Duke of Wellington in 1870, and built the present manor-house after A. Waterhouse's designs; the old house has been converted for stabling. Jane Austen was born, 1775, in the rectory house; her father held the living for a period of forty years, and John Whitefield was curate

there.—"Dawpool," situated by the Dee at Thurstaston, near Birkenhead, with 380 acres, has just been sold for nearly 50,000*l.*; the house was built for the late Mr. T. H. Ismay twenty-five years ago after plans and designs by Mr. R. Norman Shaw, R.A.

ROSCOE PICTURE COLLECTION.—In the General Powers Bill of the Liverpool Corporation authority is asked for the Liverpool Royal Institution and the Corporation to enter into agreements for the deposit of the Roscoe collection of pictures and casts in a suitable building provided by the Corporation, and that in the event of such deposit the Corporation may exercise all necessary powers for the exhibition, preservation, etc., of the pictures, and may apply the general rates of the city to the purpose.

SCHOOL OF ART AT LEIGHTON HOUSE, KENSINGTON.—A school of art has just been opened in the studios of Leighton House, under the superintendence of Mr. A. R. Smith, who won the Royal School of Art Travelling Scholarship in 1905, as master of the school. An art library is provided for the students, who will be allowed to use the garden during the summer months for out-of-door study and work. Upon students' days the public will have access to only the ground floor of the house.

RESIGNATION OF THE CHESTER CITY SURVEYOR.—Owing to continued ill-health, Mr. Isaac Matthews Jones has resigned the post of Surveyor to the Chester Town Council, after forty-two years' service. He will, however, still continue in the service of the Council in the capacity of consulting surveyor.

LIVERPOOL CUSTOM HOUSE.—Exclusive of the portion on which the Dock Board's new offices are erected, and of the area on which the Liver Society's offices are to be built, there is enough of George's Dock site remaining to accommodate several other large structures. With the object of disposing of the portion in their hands, the Corporation have conducted a series of unproductive negotiations extending over many months. Efforts to induce the Treasury to build a new Custom House on what is known as the central block of land have so far failed, but a new scheme, dictated by a desire for economy, is now in the air. To the eastward of the Dock offices, at the bottom of James-street, is a piece of land with an area of 3,700 sq. yds., belonging to the Dock Board, which had been fancied for the erection of public baths. At its last meeting the City Council was asked to sanction the purchase of it, but declined to subscribe to the Dock Board's stipulation, that any building erected upon it should not exceed two stories high. It is now suggested that the Dock Board should waive that stipulation, and assist the City Council to persuade the Treasury to have the new Custom House built there, with the proposed public baths in the basement. This is an old scheme revived, and its sanction is now occupying the attention of the Corporation.—*Liverpool Post and Mercury.*

PLUMBERS' COMPANY.—At a quarterly court of the Plumbers' Company at the Guildhall on the 31st ult., the Master, Mr. W. D. Caröe, and Sir T. Vezey Strong were appointed to represent the Company in connexion with arrangements made between the Company and City and Guilds of London Institute for the approval and stamping by the Company of certificates issued by the Institute on the result of examinations in plumbing conducted by the Technological Department of the Institute. It has been arranged that the work shall be carried out under the direction of an advisory committee, on which are represented the Board of Education, the Plumbers' Company, the City and Guilds Institute, and the National Associations of Master and Operative Plumbers. A report was received from Glasgow showing that the Scottish Education Department makes its grants to classes of plumbing students carried on at the Glasgow and West of Scotland Technical College, under the charge of a special committee representing the college, the plumbing trade, and the health authorities. Reports were also received from Southampton and the district indicating the great progress which has been made in the registration of plumbers and an increased desire on the part of the public that the work of plumbing should be placed in absolutely efficient hands.

LIBRARY, ETC., AT LANARK.—The Lanark Corporation are promoting an Order in the ensuing session of Parliament to deal, amongst other things, with certain trust funds. Under the will of Mr. Charles Lindsay, certain property was left, the interest on which was to be used for erecting a library, reading-room, and museum within the borough. A question arose as to whether any portion of the capital could be used for the erection of such buildings, and the Order now provides that the capital shall be so used by the trustees provided that it be not reduced below the value of 12,000*l.* It also gives power to the Town Council and the trustees to make arrangements for the erection on terms to be fixed of buildings partly to be used as municipal buildings and partly as a reading-room, library, and museum.

POST OFFICE BUILDINGS AT GLASGOW.—By an Order promoted under the Private Legislation Procedure (Scotland) Bill the Postmaster-General is seeking powers to acquire land and erect buildings for the extension of the Glasgow Post Office.

ART ACQUISITIONS BY THE VICTORIA AND ALBERT MUSEUM.—In the report of the Board of Education for the year 1906-7, dated December 19, 1907, it is stated that among the more important objects acquired for the collections by purchase were the following:—Two painted ivory caskets, Hispano-Moresque, XIIIth or XIVth century; a tapestry woven in wool and silk with Chinese subjects, English (Soho), first half of the XVIIIth century; satin brocade robe with figure subjects, Persian, XVIIth or XVIIIth century; woollen pile carpet, Spanish, late XVIth century; woollen pile carpet woven with archaic representations of dragons and other animals, probably Persian, anterior to the XVth century; two painted doors from the Hall of Forty Columns in the Royal Palace at Ispahan, built during the reign of Shah Abbas I. (1587-1628); four columns of carved teak from a pavilion at the Adahana Malua Vihara, Kandy, Ceylon, about 1200 A.D.; a panel of stained and painted glass with the arms of Klingeberg, Swiss, first half of XVIth century; a pair of enamelled brass candlesticks, English, first half of XVIth century; a collection of pottery from the site of ancient kilns at Sawankalok, Siam; a bowl of earthenware with the arms of the Gabrielli family of Venice, Hispano-Moresque (Valentia), second half of XVth century; and a water-colour drawing by Sir J. E. Millais, Bart., P.R.A., of "The Eve of St. Agnes." Notable among the gifts and bequests for the year is a collection of carved French stonework given by Mr. J. H. Fitzhenry, comprising a carved and painted column and two carved capitals, Romanesque, XIIth century; a panel carved with the Annunciation and the Nativity, French (School of Troyes), XVth century; a panel carved with four figures under arcades, early XVth century; a carved doorway from Clermont-Ferrand, dated 1557. Mr. Fitzhenry also gave two panels of a rood screen, with figures of St. Helen and a nun, from Tatterford Church, Norfolk, late XVth century. Sir Charles Dilke, Bart, M.P., presented a woollen pile rug, Spanish, XVIIth century. Col. W. F. Tipping gave a silver and silver-gilt mace, Italian work, middle of the XVIIIth century, with leather case decorated with gilt tooling. Objects of ancient Egyptian workmanship have been received from the Egypt Exploration Fund and the British School of Archæology in Egypt. Sir H. Watkin Williams-Wynn, Bart., lent a painted sedan chair made from designs by Robert Adam, English, late XVIIIth century. Among the gifts to the Art Library may be mentioned a collection of thirty-six volumes, chiefly on the history of Art, given by Mr. George Wardle. In connexion with the presentation of a testimonial to Mr. R. Phené Spiers, F.R.I.B.A., a committee was formed for the purpose of making a collection of drawings of architecture, which it was proposed to present from time to time, as acquired, to one of the national museums. This proposal was accepted by the Board of Education on behalf of the Victoria and Albert Museum, and, as the result of an appeal issued by the committee on June 1, 1906, forty-eight drawings or sets of drawings, etc., have been received. These form a most valuable addition to the section. They are separately catalogued, in accordance with the arrangements made with the committee, as the "Phené Spiers' Collection of Drawings of Architecture." To facilitate this work, a topographical index to the measured drawings has been made and is now being printed. The fine collection of enlarged photographs of Norman doorways and sculptured tympana, presented in former years by Mr. C. E. Keyser, was augmented during the year by the addition of twenty-one similar photographs. This collection is now a very valuable record, as it includes reproductions of nearly all the known carved Norman tympana and lintels in England. A very large number of photographs of art objects in Bohemia was presented to the Library by Herr Langhans, of Prague.

ROYAL INSTITUTION LECTURES.—In his third lecture on Astronomy, delivered on Thursday last week, Sir David Gill dealt with the sun and the planets nearest to it, giving details as to size, mass, and distance of the sun, and adopting as to its heat the theory that this heat is sufficiently to be accounted for by the continual contraction of its matter under the force of gravitation towards its centre. Its present heat, he said, would be accounted for if the diameter contracted by as much as 380 ft. annually, a change which might be going on for 5,000 to 10,000 years before the diminution in size could be detected by the most delicate measurements we could employ. In speaking of Mercury and Venus, he mentioned how the transits of Venus had been made use of to get a more accurate measurement of the distance of the sun. In dealing with the moon, he showed by a relief model how the angle at which the sun's light was thrown on it, in respect of vision from the earth, modified the appearance of details on the surface, which were much better brought out when the light fell at an acute angle than when it was full on the moon's surface. In his fourth lecture, on Monday last, he spoke of the planets outside the earth in the solar system. In that connexion, he mentioned the curious coincidence that Swift had credited the inhabitants of his "Laputa" with having discovered two satellites revolving round Mars, at a time when no such satellites had been discovered or (scientifically) suspected, and that the periods of revolution which Swift assigned to them were actually very nearly the same as those now determined by observation. The theories of Professor Lowell as to the so-called "canals" in Mars and their artificial construction by imagined inhabitants Sir David evidently thought very lightly of; and the assumed doubling of some of the "canals" he attributed to optical illusion on eyes fatigued with minute observations. That there might be living inhabitants of some kind on Mars he did not deny, but the "canals" were no proof of it. He then went through some observations on the asteroids and the greater planets, showing among other things how one of the asteroids, in the approach of its orbit to Jupiter, had been of use in determining the mass of that planet. In regard to Saturn's ring he referred to the modern and physically inevitable conclusion that this ring must be composed of small lumps of matter, not a solid plane revolving round the planet, nor of anything like a solid disc of matter, which could not under the circumstances maintain its cohesion. In alluding to the wonderful feat of mathematical analysis which led to the discovery of Neptune, he observed that both the English and the French astronomers (Adams and Leverrier) were equally entitled to the credit of it, though Leverrier's was the first published announcement.

WELSH NATIONAL WAR MEMORIAL.—Six sculptors have been invited to submit sketch-models for the national memorial to be erected in the Cathays Park, Cardiff, to commemorate the Welsh soldiers who fell in the late South African war. The assistance of the Society of British Sculptors was obtained in drawing up the conditions, and the society nominated Mr. George Frampton, R.A., to act with the Earl of Plymouth, as assessor.

Patents of the Week.

APPLICATIONS PUBLISHED.*

27,632 of 1906.—W. J. GILLILAND: *Combined Metal and Concrete Structures.*

This relates to a concrete structure, such as a girder, truss, stanchion, cantilever, or the like, wherein metal bars perforated along their length and placed so as to resist tensile stresses are rigidly connected together within the concrete mass by other bars perforated at intervals along their length.

28,866 of 1906.—A. H. LESSELLS: *Latch Locks.*

This relates to a door lock comprising duplex bolts, the ends of which are rounded and bevelled in opposite directions, said bolts being actuated by the same handles and respectively adapted to engage suitable striking plates or equivalent devices when the door is open or closed, whereby such door may be released in either its open or closed position by the same handle.

1,124 of 1907.—W. OATES: *Construction of Chimney-pot or Ventilator.*

This relates to a chimney-pot or ventilator comprising the combination of a shaft or lower portion having a number of shielded and upwardly-inclined openings and an upper portion composed of louvres having flanges forming horizontal wind inlets and a wind-shield formed by webs.

2,679 of 1907.—W. SCHULZ and O. LAMBRECHT: *Fastening for Scaffolding.*

This relates to a support for scaffolding comprising the combination of two pairs of pivotally-mounted tongs embracing the vertical beam, means to tightly press the horizontal beam against the vertical beam consisting of a

* All these applications are in the stage in which opposition to the grant of patents upon them can be made.

system of levers connecting said tongs to a timber support, an adjusting mechanism adapted to enable in any position of the tongs a horizontal adjustment of the plate or timber support, and mechanism to hold fast the levers of the lever system.

5,684 of 1907.—S. E. WALTON and W. F. E. BROWN: *Means for Securing Window-blinds to the Rollers.*

This relates to means for securing window-blinds to the rollers, characterised by a spring clip made either from sheet metal or otherwise produced, and either plain or perforated, or covered with a woven or fabric, so that when the edge of the blind is placed on the roller and one or more clips sprung thereon the blind is secured.

16,563 of 1907.—G. BALL: *Method of Manufacturing Hand-made Roofing Tiles.*

This relates to a method of making smooth-faced, hand-made roofing tiles by placing clay into a mould, removing surplus clay by means of a wire, and polishing the surface of the tiles by means of a steel or wooden plane.

16,704 of 1907.—W. P. WILLCOX: *Making of Keys or Plugs for Use with Gas and Liquid Fittings.*

This relates to gas and liquid fittings, and consists in producing the keys or plugs in one piece from a section of rod metal having a circular body portion with outstanding wings or flanges, in contradistinction of casting or making the same up of composite parts.

16,722 of 1907.—L. O. HOWELL: *Devices for Cleaning the Bowls of Water-closets and the like.*

This relates to a pneumatic cleaning device for cleaning the bowls of water-closets and the like, in which is compressed a hollow compressible body substantially spherical in shape provided with exterior corrugations arranged in two sets or series, one set facing in one direction and the other set facing in the opposite direction, and a manipulating handle attached to the hollow body at a right angle to both series of corrugations.

21,791 of 1907.—J. A. BENISCH: *Doors.*

This relates to a door, comprising the combination with a door-frame comprising a hollow post, a door comprising a plurality of vertical strips engaging with one another and hinge straps pivotally connecting said strips together, a roller attached to said door, a stationary track for said roller, actuating mechanism within the hollow post arranged to support and to open the door, said mechanism comprising a spindle, a spring arranged to rotate the spindle and a cam, and a spring arranged to take into the surface of the cam to hold the door at any desired point along its path of movement against action of the actuating mechanism.

6,806 of 1907.—E. P. BIRCH: *Covering of Floors, Walls, and other Surfaces.*

This relates to a covering for floors, walls, and other surfaces made up of sections, each formed of plaster composition cast in an open mould and of a base of canvas wire-gauze or other material adapted to afford a key for the position, said section being placed *in situ* according to a pre-arranged pattern, and the remainder of the floor covering made up around them in the plastic state in the ordinary way.

12,565 of 1907.—P. T. BURKHOLDER: *Moulds for Moulding Fence Posts and the like.*

This relates to a mould having detachable side walls which extend beyond a detachable end wall, a plurality of sections arranged in parallelism and spaced apart, and partitions disposed vertically intermediate between the side walls and extending between the sections for entirely occupying the spaces therebetween, the ends of said partitions extending within slots in the end walls, one of the end walls having inclined surfaces intersecting the wall-slots therein.

509 of 1907.—INGERSOLL-RAND COMPANY: *Hammer-drills.*

This relates to a hammer-drill comprising the provision of an open-ended hollow guide-sleeve for movably supporting the hand-feed hammer-drill independently of the operator, and the provision of one or more guide-rings fitted to enter and slide along the bore of said sleeve for guiding the drill in its sliding movements.

11,401 of 1907.—F. RICHARDSON: *Trap for Baths, Lavatory Basins, Sinks, or other Vessels; also applicable to Waste and Overflow Pipes.*

This relates to a trap for sanitary purposes, comprising the provision of a removable apron valve, said apron valve giving a full-flowing waterway through the trap direct to the outlet.

15,765 of 1907.—H. COLLOSEUS: *Manufacture of Cement or Cementitious Material.*

This relates to the manufacture of cement from slag, and consists in injecting small quantities of the hydroxides of the alkalis (potassium and sodium hydroxide), or of the alkaline earths (barium and strontium hydroxide), or of iron or aluminium, in a sprayed or atomised state, into the hot liquid slag. The slag is then cooled, and when ground produces an efficient cement without any other additions being required.

3,027 of 1907.—J. R. PRESTON: *Apparatus for Hot-water Supply.*

This relates to apparatus for hot-water supply, comprising the arrangement of either the boiler flow or boiler return pipe outside and surrounding the other, such return pipe also serving to convey the feed water from the tank or ball-tap to the boiler.

5,543 of 1907.—J. F. COWPER: *Fireproof Floors, Ceilings, Roofs, and Similar Structures.*

This relates to a fireproof floor or similar structure, comprising terra-cotta or similar blocks with sides inset or recessed to form cavities between adjacent blocks, a concrete filling in the cavities having keying projections moulded thereon by the corresponding recesses or grooves in the sides of the blocks, reinforcing bars or rods embedded in the concrete filling and suspended by bridles from the main joists or girders, and a covering layer of concrete over the blocks and their supports.

7,667 of 1907.—E. B. MAY: *Automatic Relief Valve.*

This relates to the general class of devices designed to automatically relieve steam heating systems from the accumulation of fluid arising by reason of condensation, comprising an inclosing shell provided with an inlet and an outlet, a duct extending from the outlet to a point higher in the shell, two valves controlling communication between the interior of the shell and the duct, and an arrangement by which a float is positioned between the valves and is connected therewith whereby movement of the float serves to control the operation of said valves.

10,924 of 1907.—J. DOUGAN: *Reinforced Concrete and Mechanism for Producing the Metal Beam or Bar for Reinforcing the same.*

This relates to a method of producing a light, open double-flanged or bulbed bar or beam with an open midrib by expanding the cuts and expanding the metal of the midrib, the rolls for cutting said bar or beam consisting of two cylindrical rolls with cutters, male and female, working into each other and making intermittent cuts, an inclined Boulster die similar to a V being used for the separation of the bulbs by a continuous pull, by the rolls, of the bar through the die for expansion of the cuts or extension of the metal.

14,564 of 1907.—D. C. MILLER and O. C. HUSBAND: *Hand and Finger Protectors for the Use of Bricklayers.*

This relates to a bricklayer's mitt, comprising a wrist-band, thimbles or finger-end protectors, straps connected with the inner ends of the latter expanding over the upper portions of the fingers and connected at their rear ends with the wrist-band, and a band extending around the hand forward of the thumb and connected on the back of the hand with the said straps to keep them properly spaced and affording protection to the knuckles and palm of the hand.

15,882 of 1907.—G. MEYER: *Lock for Doors.*

This relates to a lock for doors, comprising the combination of a hooked slide-bolt held stationary when closing the door with a gravity catch adapted to engage the hooked portion of the slide-bolt, the engaging surfaces of the bolt and gravity catch being so inclined as to form an automatic clutch for these parts.

16,253 of 1907.—J. LANG: *Manufacture of Window-frames.*

This relates to a method of making stationary window-frames, which consists in cutting the four external frame-pieces with bevelled-off ends from rolled iron or steel and cutting holes in same; cutting the internal frame-pieces from sash iron or steel, cutting gaps and slits into the upper webs of the internal frame-pieces to be disposed in one direction, and heating and so bending same as to form openings corresponding to the cross-sections of the other internal frame-pieces; so cutting out the ends of all the internal frame-pieces that they can engage in the holes of the external frame-pieces while otherwise fitting the latter, passing through the openings of the bent internal frame-pieces the other internal frame-pieces, and composing all the pieces to form a stationary window-frame; welding the bevelled-off ends of the four external frame-pieces, riveting the ends of all the internal frame-pieces on the external frame-pieces, and directing an oxy-hydrogen blow-pipe towards each crossing point of the internal frame-pieces so as to preliminarily weld the upper parts of the joint while a gap is formed; then inserting pieces of weldable metal in the several gaps and directing the oxyhydrogen blow-pipe towards the insertions for welding them on the frame-pieces and thus filling up the gaps.

19,248 of 1907.—N. VON SCHEIBENHOF: *Method of Hinging Closet-seats, Seat-lids, and the like.*

This relates to a hinge for closet-seats, seat-lids, and the like, comprising the combination, with a hinge-bolt consisting of a number of parts alternately connected to a fixed part and to a movable part, and which are in revoluble connexion with one another, of loose rings mounted on the adjacent ends of the parts of the hinge-bolt.

28,246 of 1906.—W. TYREE: *Automatic Spray for Painting, Agricultural, Disinfecting, and other Analogous Purposes.*

This relates to an automatic spray, comprising a cylinder or chamber having an outlet or outlets, through which paint or a liquid or solution may be forced by the action of acetylene gas, and converted by attachments thereto into spray, in combination with a carbide and water-chamber outside said cylinder and attached thereto for the generation of acetylene gas, and the application of said gas as a motive force to said cylinder or chamber containing the paint liquid or solution.

641 of 1907.—C. J. LOMAX: *Method of Making Good, Defective or Leaking Joints in Sanitary and other Pipes.*

This relates to a method of rectifying defects existing in the cement ring of the primary chamber in the process of jointing spigot and socket pipes, by the introduction from the joining or secondary chamber of liquid cement under pressure calculated to force sufficient of such liquid cement contents of this secondary chamber into the interstices constituting the defects of the solid primary ring.

8,901 of 1907.—NATIONAL WATER MAIN CLEANING COMPANY: *Devices for Cleaning Pipes and Conduits and the like.*

This relates to a device for passing cables through water-mains, comprising a flexible cup-shaped member suitably attached to a head, and being provided with a buoyant portion at the front of the head, which member is pulled through the pipe section to be cleaned.

16,602 of 1907.—W. H. HESS: *Pulverisers.*

This relates to a pulverising machine for stone and similar material, and relates more particularly to that type of pulverising machine which operates upon the material in suspension, and comprises a revoluble pulveriser cage with means for revolving the same in connexion with a revoluble enclosing cylinder which embodies a screen, and a circular series of breaker plates, which latter are spaced from the cage, and means for revolving the said cylinder.

19,607 of 1907.—W. DIBBERN: *Pins, Nails or the like.*

This relates to pins, nails, or the like, and consists essentially in providing a covering or cap for the heads of said pins, nails, or the like, said cover being formed of coloured or variegated celluloid.

25,693 of 1907.—H. MACCOLL: *Construction of Fixed Ladders Giving Access to the Holds of Iron or Steel Ships and Steamers.*

This relates to fixed ladders giving access to the holds of iron or steel ships and steamers, wherein, instead of a hold ladder made in the usual manner with iron steps or rungs riveted or otherwise fixed into iron sides or stanchions, steps are cut out of the central web of a rolled iron or steel joist of I-section, and of suitable length. A wide yet strong ladder may be made by placing two of these ladders side by side and riveting or bolting them together.

1,405 of 1907.—T. WALLBANK: *Tipping Arrangement for Carts and the like.*

This relates to a tipping arrangement for carts and the like, wherein segmental racks fixed to the chest or top part of the frame of the cart pass through slots in the shafts and engage with a pinion attached to a cross-shaft which extends across the front of the cart. By turning the pinions (by means of a hand wheel fixed to the said cross-shaft) the body of the cart can be raised or lowered as required. Pawls are provided to lock the pinions when the body of the cart is in its raised position, and pins are provided at the ends of the racks to limit their movement.

27,875 of 1906.—A. CLARK: *Fireproofing of Safes and Strong-rooms.*

This relates to means for making safes and strong-rooms capable of resisting fire in a more effective manner than heretofore, and consists essentially of a mixture for filling the fireproof chambers of the safe or strong-room whereby the same may withstand great heat. The mixture is made of 30 to 50 per cent of crystallised sulphate of magnesium and the balance of sawdust, wood pulp, asbestos, mica, soapstone, carbon, china clay, or Portland cement. The crystallised sulphate of magnesium may be used alone.

PATENTS—*Continued on page 56*

List of Competitions, Contracts, etc.

For some Contracts still open, but not included in this List, see previous issues. Those with an asterisk (*) are advertised in this Number: Competitions, iv.; Contracts, iv. vi. viii. x.; Public Appointments, xvii.; Auction Sales, xxviii.

Certain conditions, beyond those given in the following information, are imposed in some cases, such as: the advertisers do not bind themselves to accept the lowest or any tender; that a fair wages clause shall be observed; that no allowance will be made for tenders; and that deposits are returned on receipt of a bonâ-fide tender unless stated to the contrary.

The date given at the commencement of each paragraph is the latest date when the tender, or the names of those willing to submit tenders, may be sent in.

***** It must be understood that the following paragraphs are printed as news, and not as advertisements: and that while every endeavour is made to ensure accuracy, we cannot be responsible for errors that may occur.**

Competitions.

JANUARY 18.—**Oldbury.**—SCHOOLS.—Oldbury U.D.C. Education Committee invite names and addresses of, architects desirous of submitting competitive plans for proposed new mixed and infant schools at the corner of Abbey-road and Barclay-road, Warley. Names should be sent to Mr. Sydney Vernon, Secretary, Public Buildings, Oldbury.

JANUARY 31.—**Pontypridd.**—OFFICES.—Pontypridd Guardians invite competitive designs for the erection of Administrative Offices in Court House-street, Pontypridd. Intending competitors may, on payment of a fee of 2*l.* 2*s.*, obtain all information with reference to the Guardians' requirements from Mr. William Spickett, Clerk to the Guardians, Union Offices, Pontypridd.

* NO DATE.—**Lowestoft.**—SCHOOL.—The Lowestoft Education Committee invite competitive designs for a new secondary school. For further particulars see advertisement in this issue.

Contracts.

BUILDING.

JANUARY 11-FEBRUARY 10.—**Middleton, Saxmundham.**—SCHOOL ENLARGEMENT.—East Suffolk County Education Committee invite tenders for the alteration and enlargement of the Middleton Public Elementary Council School (near Saxmundham). Names to Mr. W. E. Watkins, Secretary, Education Office, County Hall, Ipswich, on or before January 11.

JANUARY 13-18.—**Elland.**—RESIDENCE.—Erection of a detached residence, boundary walling, and appurtenances in Victoria-road, Elland. Plans, etc., may be seen, and bills of quantities obtained, upon application at office of Mr. Thos. Kershaw, A.R.I.B.A., architect, Lancs and Yorks Bank-chambers, Halifax.

JANUARY 13.—**Merrymeet.**—CHAPEL.—The erection of a Wesleyan Chapel at Merrymeet. Plans, etc., can be seen at office of Mr. John Sansom, F.R.I.B.A., architect, Liskeard.

JANUARY 14.—**Frodingham.**—HOUSES.—The erection of twenty houses, Frodingham, Lincoln. Plans, etc., may be seen, and forms of tender obtained, at the office of Mr. Alexander M. Cobban, Engineer and Surveyor, Albion-buildings, Scunthorpe.

JANUARY 15.—**Crosskeys.**—HOUSES.—The erection of thirty houses at Crosskeys. Plan, etc., may be seen at office of Mr. R. L. Roberts, M.S.A., Abercarn.

JANUARY 16.—**Cork.**—COTTAGES.—Cork R.D.C. invite tenders for building seventy-seven labourers' cottages and fencing same number of cottage plots. Plans, etc., can be obtained from the Clerk to the R.D.C. on payment of 5*s.* Mr. John Cotter, Clerk of Council, Board-room, Workhouse, Cork.

JANUARY 16.—**Elgin.**—LAUNDRY, ETC.—The mason, carpenter, slater, plumber, plaster, iron, painter, and glazier works of new chimney stalk and reconstruction of laundry at Blackfriars-road, for the Moray and Nairn Laundry Company, Ltd. Plans, etc., may be seen with, and schedules of quantities obtained from, Mr. Charles C. Doig, architect, Elgin.

JANUARY 16.—**Huddersfield.**—HOUSES.—Nine dwelling-houses in Perseverance-street, Primrose Hill. Plans may be seen, and bills of quantities obtained, at office of Mr. J. Berry, architect and surveyor, 3, Market-place, Huddersfield.

JANUARY 16.—**Wandsworth.**—REPAIRS.—Wandsworth Guardians invite tenders for carrying out internal repairs to 123, Battersea Park-road. Specification, etc., can be obtained upon application at office of Mr. F. W. Piper, Clerk to the Guardians, Union Offices, St. John's-hill, S.W.

JANUARY 17.—**Dipton.**—LOCK-UP.—Tenders are invited for the erection of a new lock-up at Dipton. Plans, etc., may now be seen, and bills of quantities obtained, at the County Surveyor's Office, Shire Hall, Durham.

JANUARY 17.—**Skelmersdale.**—COTTAGES.—The Skelmersdale Co-operative Society invite tenders for the erection of two cottages in Witham-road, Skelmersdale. Plans, etc., may be inspected at Mr. Ashurst's, 36, White Moss-road, Skelmersdale.

JANUARY 18.—**Beeston.**—SCHOOL.—The Administrative Sub-committee for the Tarvin and Whitchurch Union Area (Chester County) invite tenders for alterations and additions to the Council school at Beeston. Plans, etc., can be seen, and quantities obtained, on deposit of 1*l.*, at the offices of Mr. H. Beswick, County Architect, Newgate-street, Chester.

JANUARY 18.—**Blaenavon.**—SCHOOL.—Monmouthshire Education Committee invite tenders for the erection of a class-room and other works at the Hillside Council School, Blaenavon. Plans, etc., may be seen at the C.C. Offices, Newport, Mon. Quantities supplied.

JANUARY 18.—**Cardiff.**—COVERED WAY.—Cardiff Guardians invite tenders for construction of a covered way between Blocks J and K at Cardiff Workhouse. Form of tender, etc., may be obtained from Mr. Arthur J. Harris, Clerk, Union Offices, Queen's-chambers, Cardiff.

JANUARY 18.—**Penistone.**—SCHOOL.—West Riding C.C. Education Committee invite whole or separate tenders for new school at Penistone, builder, joiner, slater, plumber, plasterer, painter; Harthill-with-Woodall Provided School, near Sheffield, improvements and asphalting (builder, asphalter). Plans may be seen, and bills of quantities obtained, on application to office of Mr. J. Vickers-Edwards, County Architect, County-hall, Wakefield. A deposit of 1*l.* is required in each case. Cheques, etc., must be made payable to the West Riding Treasurer, and sent to him direct at the County Hall, Wakefield.

JANUARY 18.—**Sandbach.**—RESEATING.—For reseating a portion of Primitive Methodist Chapel, Sandbach. For plan and specifications apply to Messrs. Alfred Price & Son, architects, Sandbach.

* JANUARY 18.—**Worthing.**—POLICE-STATION, ETC.—The West Sussex C.C. invite tenders for new police-station and cottages at East Worthing. For further particulars refer to an advertisement in this issue.

JANUARY 20.—**Earlswood, etc.**—HOUSES.—Great Western Railway Directors invite tenders for the erection of twenty-three houses on the Birmingham and North Warwickshire Railway at Shirley, Earlswood, Wood End, and Danzey Green. Plans, etc., may be seen, and forms of tender, etc., obtained, at the office of the New Works Engineer, at Paddington Station, London.

JANUARY 20.—**Fishguard.**—SCHOOL.—Pembrokeshire Education Authority invite tenders for the erection of new Council school buildings at Fishguard. Drawings, etc., may be seen on application to Mr. A. B. Williams, solicitor, Fishguard, and also at the offices of the Authority's Architect, Mr. D. Edward Thomas, 17, Victoria-place, Haverfordwest. Bills of quantities and forms of tender may be obtained at the architect's offices upon payment of 1*l.* 1*s.*

JANUARY 20.—**Mulben.**—COTTAGES.—The mason, carpenter, slater, plumber, plaster, painter, and glazier works of two blocks of cottages to be erected at Glentauchers Distillery, Mulben. Plans, etc., may be seen with the Manager at the Distillery, and also Mr. Charles C. Doig, architect, Elgin.

JANUARY 20.—**Warrington.**—SHOP FRONT.—Warrington Finance and Estates Committee invite tenders for the erection of a shop front to No. 28, Sankey-street. Drawings, etc., may be seen, and forms of tender, etc., obtained, at the office of the Borough Surveyor, Town Hall.

JANUARY 21.—**Ainsdale.**—STATION BUILDINGS.—Lancashire and Yorkshire Railway Directors invite tenders for the construction and erection of station buildings, footbridge, etc., at Ainsdale, near Southport. Plans can be seen, and copies of tender, etc., obtained, on application at the Engineer's Office, Hunt's Bank, Manchester.

JANUARY 21.—**Linthwaite.**—HOUSES.—The erection of two semi-detached houses, New Royd, Linthwaite. Plans may be seen, and quantities obtained, at office of Mr. Joe Ainley, architect and surveyor, Chapel-street, Slaithwaite.

JANUARY 22.—**Grays.**—KIOSK, ETC.—The U.D.C. of Grays Thurrock invite tenders for the erection of a refreshment kiosk and a dressing shed, with appurtenant buildings, at the public recreation ground known as "The Beach," Grays. Drawings, etc., may be seen at the office of the Council's Surveyor, High-street.

* JANUARY 22.—**Lewisham.**—NEW CUBICLES.—The Metropolitan Asylums Board invite tenders for new cubicles at the Park Fever Hospital, Hither Green, Lewisham, S.E. For further particulars see advertisement in this issue.

* JANUARY 22.—**Poplar.**—LEAN-TO SHED, ETC.—The Poplar Guardians invite tenders for building a lean-to shed, etc., at the Langley Receiving Home for Children, 54, East India Dock-road, Poplar. For further particulars see advertisement in this issue.

JANUARY 24.—**Edinburgh.**—BOUNDARY WALL.—Edinburgh and District Water Trustees invite tenders for erecting a boundary wall round their feu at Forresthill Cottage, near Broughton, Peebles-shire. Plans may be seen, and copies of the specification, etc., obtained, at the office of the Engineer, Mr. W. A. Tait, C.E., 72*a*, George-street, Edinburgh, on payment of 1*l.*

JANUARY 27.—**Bury.**—CHIMNEY SHAFT.—The Corporation of Bury invite tenders for the erection of a chimney shaft, 180 ft. high, at the intended Electricity Generating Station. Chamber Hall, Bury. Drawings may be seen, and specification, etc., obtained, upon application to Mr. Arthur W. Bradley, A.M.Inst.C.E., Borough Engineer and Surveyor, Bank-street, Bury, on payment of a deposit of 1*l.*

* JANUARY 28.—**Walthamstow.**—NEW SCHOOLS.—The Walthamstow Education Committee invite tenders for proposed new blocks for boys' and girls' departments at Selwyn-avenue, Highams Park. For further particulars refer to an advertisement in this issue.

NO DATE.—**Birkenhead.**—MANUFACTORY.—For the erection of a tapestry manufactory in Norman-street, Birkenhead, for Messrs. Arthur H. Lee & Sons. Plans, etc., may be seen at the office of Mr. J. R. Mewton, architect, 59, Hamilton-square, Birkenhead, where bills of quantities and form of tender may be obtained upon the payment of a deposit of 10*s.*

NO DATE.—**Carrog.**—SCHOOL.—The Welsh Campaign Committee invite tenders for building an elementary school at Carrog, near Corwen. The plans, etc., may be obtained from Messrs. Deakin & Howard Jones, M.S.A., architects, Borth, R.S.O., on payment of 1*l.* 1*s.*

NO DATE.—**Terrington St. Clement.**—RESIDENCE.—For the erection of residence for Mr. Frank Law, on the Alma Lodge Estate at Terrington St. Clement. Plans may be seen, and quantities obtained, at offices of Messrs. Walker & Walker, architects and surveyors, Hill-street, Wisbech, upon deposit of 1*l.* 1*s.*

ENGINEERING, IRON, AND STEEL.

JANUARY 13.—**Belfast.**—PUMPING STATION.—Belfast Improvement Committee invite tenders for the erection of a pumping station in Park-avenue, Belfast. Drawings, etc., may be seen, and bills of quantities obtained, at the office of the City Surveyor, on payment of 1*l.* 1*s.*

JANUARY 14.—**Hammersmith.**—LAUNDRY MACHINERY.—Hammersmith Guardians invite tenders for the supply of laundry machinery. Forms of tender, etc., may be obtained by sending a stamped foolscap envelope to Mr. J. Lamb, Clerk to the Guardians, 206, Goldhawk-road, Shepherd's Bush, W.

JANUARY 14.—**London.**—SPANS, ETC.—The Secretary of State for India in Council is prepared to receive tenders for supply of spans, deck. The conditions of contract may be obtained on application to the Director-General of Stores, India Office, Whitehall, S.W.

JANUARY 14.—**Newton Heath.**—CULVERT.—Manchester Corporation Improvement and Buildings Committee invite tenders for the reconstruction of the culvert under Hulmes-road, Newton Heath. Drawings may be seen, and specifications, etc., obtained, on application at the City Surveyor's Office, Town Hall, Manchester, on payment to the City Treasurer of 2*l.* 2*s.* All cheques or postal orders are to be made payable to the order of "The Corporation of Manchester."

JANUARY 16.—**Fleetwood.**—ELECTRIC LIGHTING.—Tenders required for lighting the Primitive Methodist new Sunday School, Fleetwood. Plans, etc., to be seen at the Rev. E. Mather's, Promenade-road, Fleetwood.

* JANUARY 16.—**Southwark.**—WELL AND PUMPS.—The Southwark Guardians invite tenders for alterations to well and pumps at the Infirmary, East Dulwich-grove, S.E. For further particulars see advertisement in this issue.

JANUARY 17.—**Hull.**—HEATING, ETC.—Hull Property Committee invite tenders and schemes for the heating, ventilating, hot-water supply, etc., of the Public Hall shops, etc., now in course of construction. Forms of tender, etc., may be obtained at office of Mr. Joseph H. Hirst, City Architect, Town Hall, Hull, on payment of a deposit of 2*l.* 2*s.* to the City Treasurer.

JANUARY 17.—**Wolviston.**—WIDENING BRIDGE.—(*a*) For widening Wolviston North Bridge; (*b*) for reconstructing Oxen-le-Field Bridge, Croft. Plans, etc., may be seen, and bills of quantities obtained, at the County Engineer's Office, Shire Hall, Durham.

JANUARY 22.—**Hornchurch.**—PUMP.—Romford U.D.C. invite tenders for the supply and fixing at their pumping station, "Bretons Farm," Hornchurch, of a Gwynne's Invincible Patent Centrifugal Pump. A copy of the specification, etc., can be obtained on application to Mr. Charles T. King, Clerk, Council Offices, Romford.

JANUARY 23.—**Cardiff.**—PLANT.—Cardiff Corporation invite tenders for extra high-tension 3-phase feeder cable and 1-500 K.W. motor generator. General conditions, etc., may be obtained from Mr. Arthur Elf's, City Electrical Engineer and Manager, Central Offices, The Hayes, Cardiff.

FEBRUARY 1.—**Great Yarmouth.**—PLANT.—Great Yarmouth Corporation invite tenders for the supply, delivery, and erection of one 400-kw. continuous-current traction steam generator. Copies of specification, etc., may be obtained from Mr. Gordon Bryant, Borough Electrical Engineer, Electricity Department, 26, King-street, Great Yarmouth, on payment of 1*l.* 1*s.*

FEBRUARY 14.—**Kiew, Russia.**—CANALISATION WORKS.—The Town Board of Kiew, Russia, invites contractors who would undertake the first canalisation works as collectors, machine stations, and biological filters for the amount of 1,300,000 roubles. Detailed plans, etc., can be examined in the Town Office (*on prava*) from January 2 to 15.

FEBRUARY 19.—**Finchley.**—FIRE ENGINE.—The Fire Brigade Committee of U.D.C. of Finchley invite tenders for the supply of a steam motor fire engine.

Full particulars may be obtained on application to the Chief Officer at the Central Station, Church End, Finchley.

NO DATE.—**Gosport.**—REFUSE DESTRUCTOR.—Gosport and Alverstoke U.D.C. invite tenders for the supply and installing of a modern refuse destructor at their air-compressing station, together with air-compressor and other plant. A plan of the site may be seen, and full particulars, etc., obtained, upon application to Mr. Herbert Frost, Engineer and Surveyor to the Council, Town Hall, Gosport, upon payment of 2l. 2s.

MISCELLANEOUS.

JANUARY 14.—**Devonport.**—DRY DOCKING.—Devonport Corporation invite tenders for dry docking and repairing the pontoon at Pottery Quay, Devonport. The specification, etc., can be obtained at the Borough Surveyor's office, 29, Ker-street, Devonport, on payment of 1l. 1s.

JANUARY 15.—**Ballater.**—BOWLING GREEN, ETC.—The formation of bowling green and tennis courts for the Golf Club, Ballater. The plans, etc., may be seen with, and schedules of quantities obtained from, Messrs. Jenkins & Marr, C.E., and architects, 16, Bridge-street, Aberdeen.

JANUARY 15.—**Gravesend.**—GAS MANTLES.—Gravesend T.C. invite tenders for the supply of incandescent gas mantles. Specification, etc., may be seen at the Borough Surveyor's Office, Town Hall, Gravesend.

JANUARY 15.—**Liverpool.**—OFFICE FITTINGS.—Toxteth Park Guardians invite tenders for the fitting-up of offices at 15, High Park-street. Plan, etc., can be obtained on payment of 1l. 1s. at the office of the architect, Mr. Walter W. Thomas, 15, Lord-street, Liverpool.

JANUARY 16.—**Cork.**—FENCING.—Cork R.D.C. invite tenders for fencing seven additional allotments to existing cottages. Ordnance sheets may be inspected, and specifications, etc., obtained, at the office of the Clerk to the R.D.C., Mr. John Cotter, Board-room, Workhouse, Cork.

JANUARY 18.—**Paddington.**—SCAVENGING.—Paddington B.C. invite tenders for (1) disposal of the slop, rough dust, etc., collected in the Borough; (2) (*a*) collection and disposal of house refuse, (*b*) street cleansing, and (*c*) street watering in a north-eastern district of the Borough. Forms of tender will be furnished upon application to the Borough Accountant, and after payment to him of a deposit of 10s. 6d. for each form.

JANUARY 20.—**Dalton-in-Furness.**—IRON FENCING.—Dalton-in-Furness U.D.C. invite tenders for the supply and erection of aobut 130 lin. yds. of wrought-iron unclimbable fencing 5 ft. high. Designs and specifications must accompany tenders. Further particulars can be obtained from Mr. W. Richardson, Town Surveyor, Town Hall, Dalton-in-Furness.

JANUARY 20.—**Shalford, Hambledon.**—SCAVENGING.—The R.D.C. of Hambledon invite tenders for the collection and removal of dust, ashes, house refuse, and the contents of earth closets, and for the cleansing of the cesspools in the whole of the Parish of Shalford. Forms of tender, etc., can be obtained on application at office of Mr. Ferdinand Smallpeice, Clerk to the Council, 138, High-street, Guildford, or of Mr. E. G. Randall, the Clerk of the P.C. of Shalford.

* JANUARY 23.—**Lambeth.**—VARIOUS SERVICES.—The Lambeth B.C. invite tenders for various services for one year from March 31, 1908. For further particulars see advertisement in this issue.

* NO DATE.—**Bristol.**—EXCAVATING.—Tenders are required from contractors for excavating for water supply works. For further particulars refer to an advertisement in this issue.

NO DATE.—**Huddersfield.**—FENCING.—The erection of about 400 yds. of board fencing. For particulars apply to the Secretary, Huddersfield Association Football Ground Company, Ltd., 5, Willow-lane East, Huddersfield.

PAINTING, etc.

JANUARY 12-22.—**Wigan.**—REPAIRS, PAINTING, ETC.—Wigan Guardians invite tenders for repairs, painting, and decorating required to be done at the Medical Officer's House, No. 25, Upper Dicconson-street, Wigan. Specifications may be obtained at office of Mr. Henry Ackerley, Clerk, 9, Victoria-buildings, King-street, Wigan.

JANUARY 18.—**Cardiff.**—COLOURING, ETC.—Cardiff Guardians invite tenders for internal colouring and painting at the Cardiff Workhouse. Form of tender, etc., may be obtained from Mr. Arthur J. Harris, Clerk, Union Offices, Queen's-chambers, Cardiff.

* JANUARY 22.—**Sutton (Surrey).**—CLEANING AND PAINTING.—The Metropolitan Asylums Board invite tenders for cleaning and painting works at the Downs School, Sutton, Surrey. For further particulars see advertisement in this issue.

FEBRUARY 3.—**Manchester.**—PAINTING.—Lancashire and Yorkshire Railway Directors invite tenders for painting (thirteen contracts). Specifications and separate forms of tender may be obtained on personal application at the Engineer's Office, Hunt's Bank, Manchester.

ROADS, SANITARY, AND WATER WORKS.

JANUARY 13.—**Bristol.**—PAVING.—Bristol Sanitary and Improvement Committee invite tenders for providing and laying paving material. Specification, etc., may be obtained on application at the offices, 63, Queen-square, on deposit of 10s.

JANUARY 13.—**Hanley.**—SEWERS.—Hanley Corporation invite tenders for storm relief sewers and private street improvements (seventeen contracts). Specifications, etc., may be obtained, and plans inspected, at office of Mr. Joseph Lobley, Borough Engineer and Surveyor, Town Hall, Hanley.

JANUARY 13.—**Roydon.**—SEWERS.—Epping R.D.C. invite tenders for the construction of about 160 lin. yds. 6-in., 570 lin. yds. 7-in., 600 lin. yds. 8-in., 1,400 lin. yds. 10-in., and 225 lin. yds. 12-in. sewers, etc., and sewage disposal works in the Parish of Roydon, Essex. Drawings can be seen, and further particulars, etc., obtained, at the office of Mr. H. Tooley, F.R.I.B.A., Queen's-road, Buckhurst Hill, upon a deposit of 2l. 2s.

JANUARY 14.—**Bedford.**—PAVING.—Bedford Corporation invite tenders for paving and roadmaking in Sandhurst-place East, Bedford. Full particulars can be obtained upon application at the Borough Engineer's Office, Town Hall, Bedford.

JANUARY 14.—**Chadderton.**—SEWERS, ETC.—Chadderton U.D.C. invite tenders for the construction of earthenware pipe sewers, etc., for the sewerage of Mill Brow and Throstle Walk, Chadderton. Drawings, etc., may be seen, and quantities, etc., obtained, on application at the offices of Messrs. James Diggle & Son, civil engineers, Hind Hill-street, Heywood, and 14, Victoria-street, Westminster, S.W., on payment of a sum of 2l.

JANUARY 15.—**Redhill.**—ROAD WORKS.—Reigate T.C. invites tenders for the execution of private street improvements in Osborne, Gordon, and Alpine roads, Redhill, in accordance with the plans, etc., prepared by Mr. F. T. Clayton, C.E., the Borough Surveyor. Bills of quantities, etc., can be obtained on application to the Borough Surveyor, Municipal Buildings, Reigate.

JANUARY 15.—**Wood Green.**—CULVERTING.—The U.D.C. of Wood Green invite tenders for the execution of all the works required in the culverting of the Moselle Brook. The plans, etc., may be seen, and bills of quantities obtained, on application to Mr. C. J. Gunyon, A.M.Inst.C.E., the Surveyor, at the offices of the Council, Town Hall, Wood Green, upon payment of a deposit of 1l. 1s.

JANUARY 16.—**Cork.**—IMPROVEMENTS, ETC.—Cork R.D.C. invite tenders for:—(*a*) Covering sewer with ferrumite flags, at Church Hill-passage West; (*b*) carrying out improvements in Ballintemple Burial Ground. Forms of tender may be obtained at office of Mr. John Cotter, Clerk of Council, Board-room, Workhouse, Cork.

* JANUARY 18.—**Dartford.**—SEWERAGE.—The Dartford R.D.C. invite tenders for construction of sewers in the Parishes of Eynsford, Marningham, and Sutton-at-Hone. For further particulars refer to an advertisement in this issue.

* JANUARY 20.—**Beckenham.**—MAKING-UP.—The Beckenham U.D.C. invite tenders for making-up Clock House-road (south end). For further particulars refer to an advertisement in this issue.

JANUARY 21.—**Nelson.**—STREET WORKS.—Caerphilly U.D.C. invite tenders for paving, kerbing, channelling, sewering, forming, metalling, etc., part of Wern-crescent, Nelson. Plan, etc., may be seen, and form of tender obtained, at the Surveyor's Department, Council Offices, Caerphilly, upon depositing the sum of 1l. 1s.

JANUARY 21-FEBRUARY 11.—**Thorpe Satchville.**—SEWERS.—Melton Mowbray R.D.C. require tenders for the construction of about one mile of main earthenware and iron sewers, and sewage-disposal works in the Parish of Thorpe Satchville. Apply at the office of Mr. Edmund Jewes, Surveyor, Nottingham-street, Melton Mowbray, for plans, etc. Deposit of 5l. required.

* JANUARY 22.—**Chiswick.**—PAVING.—The Chiswick U.D.C. invite tenders for the paving of carriageway of Duke's-avenue with tarred macadam. For further particulars see advertisement in this issue.

* JANUARY 22.—**Poplar.**—TAR PAVING.—The Poplar Guardians invite tenders for laying out and tar paving the grounds of Langley House Receiving Home for Children, 54, East India Dock-road, Poplar. For further particulars see advertisement in this issue.

JANUARY 27.—**Bradninch.**—WATER MAINS.—The R.D.C. of Tiverton invite tenders for laying about 1,440 yds. of 3-in. water mains at Bradninch. Plan, etc., may be seen on application to the Council's Surveyor, Mr. R. Ellis, Tiverton.

JANUARY 28.—**Barking.**—DRAINAGE.—Barking Town U.D.C. invite tenders for the construction of an ejector chamber, manhole, and about 50 lin. yds. of patent jointed stoneware pipe sewer in connexion with the West of Roding Drainage. Plans, etc., can be seen, and specification, etc., obtained, upon application to Mr. C. F. Dawson, Surveyor to the Council, Public Offices, Barking.

JANUARY 28.—**Sutton.**—SEWER.—St. Helens Health Committee invite tenders for the construction of an intercepting sewer, about 4 miles long. Plans may be seen, and specifications, etc., obtained, on application to Mr. Geo. J. C. Broom, M.Inst.C.E., the Borough Engineer, at his office, Town Hall, St. Helens, on payment of 1l. 1s.

FEBRUARY 1.—**Wem.**—SEWERAGE, ETC., WORKS.—Wem U.D.C. invite tenders for sewerage and sewage disposal works. Drawings, etc., may be seen at the Town Hall, Wem, Salop, and bill of quantities, etc., obtained, on payment of the sum of 3l. 3s.

STONE, MATERIALS, AND STORES.

JANUARY 13.—**Glanford Brigg.**—GRANITE.—The R.D.C. of Glanford Brigg invite tenders for the supply of granite and slag. Specifications and forms of tender may be had on application. Mr. Frank C. Hett, Clerk, 11, Bigby-street, Brigg.

JANUARY 14.—**Lancaster.**—MATERIALS.—Lancaster Corporation invite tenders for the supply of fireclay pipes, grit setts, Portland cement, road materials, etc. Forms of tender, etc., may be obtained on application at the office of Mr. John C. Mount, Borough Surveyor, Lancaster.

JANUARY 14.—**Meriden.**—STONE.—Meriden R.D.C. invite tenders for the supply of granite or other similar stone. Form may be obtained at office of Mr. A. W. Liggins, Clerk, 11, Priory-street, Coventry.

JANUARY 14.—**Wallasey.**—PAVING SETTS.—Wallasey U.D.C. invite tenders for the supply of 500 tons of 4 by 4 by 4 cube setts. Form of tender, etc., may be obtained on application to Mr. W. H. Travers, Engineer and Surveyor, Public Offices, Egremont, Cheshire.

JANUARY 15.—**Keighley.**—MATERIALS, ETC.—Keighley Corporation Health Department invite tenders for workmanship and materials for the year ending January 1, 1909. Specifications, etc., at the Borough Sanitary Inspector's Office, Town Hall, Keighley.

JANUARY 15.—**London.**—CEMENT.—For 3,000 tons of Portland cement. Specifications may be obtained (by manufacturers only) on application to Messrs. Rendel & Robertson, 8, Great George-street, Westminster, S.W.

JANUARY 18-27.—**Harrogate.**—PORTLAND CEMENT.—Harrogate Corporation invite tenders for the supply and delivery at Masham Station, N.E.R. Company, of 3,500 tons or thereabouts of best Portland cement (English manufacture only). Specifications, etc., can be obtained at the office of Mr. Edw. Wilson Dixon, M.Inst.C.E., engineer, 14, Cambridge-crescent, Harrogate.

JANUARY 18.—**Poulton.**—KERBS.—Poulton-le-Fylde U.D.C. invite tenders for the supply of about 1,020 lin. yds. of 12 in. by 8 in. grit kerbs. Further particulars may be had from Mr. J. B. Moss, Surveyor, U.D.C., Masonic-buildings, Poulton-le-Fylde.

* JANUARY 20.—**Camberwell.**—STORES, ETC.—The Camberwell B.C. invite tenders for the supply of various stores, etc. For further particulars see advertisement in this issue.

* JANUARY 20.—**London.**—WORK AND MATERIALS.—The St. Pancras B.C. invite tenders for annual contracts for work or materials for one year from April 1 next. For further particulars refer to an advertisement in this issue.

JANUARY 20.—**Plymouth.**—MATERIALS.—Plymouth Corporation invite tenders for the supply of goods and materials. Schedules may be obtained on payment of a deposit of 1l. in cash for each schedule (cheques will not be received). Mr. James Paton, Borough Engineer and Surveyor, Municipal Offices, Plymouth.

* JANUARY 22.—**Chelsea.**—STORES, ETC.—The Metropolitan Borough of Chelsea invite tenders for the supply of various stores, etc., from April 1, 1908, to March 31, 1909. For further particulars see advertisement in this issue.

JANUARY 22.—**Surbiton.**—MATERIALS, ETC.—The U.D.C. of Surbiton invite tenders for the execution of works and the supply of materials, etc. Specifications, etc., may be obtained at the offices of the Council, Ewell-road, Surbiton.

* JANUARY 23.—**Lambeth.**—MATERIALS.—The Lambeth B.C. invite tenders for the supply of various materials for one year from March 31, 1908. For further particulars see advertisement in this issue.

JANUARY 25.—**Norwich.**—MATERIALS.—Norfolk C.C. invite tenders for the supply of broken granite. Upon the receipt of a stamped (2d.) and addressed large foolscap envelope, specification, etc., will be forwarded by the County Surveyor.

JANUARY 27.—**Midhurst.**—ROAD MATERIALS.—Midhurst R.D.C. invite tenders for the supply of broken granite and quartzite, tar macadam, etc. Specifications, etc., to be obtained from Mr. Arthur G. Gibbs, Surveyor to the Council, Council Offices, Midhurst.

JANUARY 28.—**Halifax.**—STORES.—Halifax Gasworks Committee invite tenders for the supply of materials. Forms of tender and further information may be obtained on application to Mr. J. Wilkinson, F.C.S., Engineer, Gasworks, Halifax.

JANUARY 29.—**Hatfield.**—GRANITE, ETC.—Hertfordshire C.C. invite tenders for the supply of broken granite and slag. Forms of tender, etc., may be obtained on application at office of Mr. Urban J. Smith, M.Inst.C.E., County Surveyor, County Surveyor's Office, Hatfield, or will be sent through the post upon receipt of a stamped addressed foolscap envelope.

JANUARY 31.—**Cheshunt.**—MATERIALS, ETC.—Cheshunt U.D.C. invite tenders for supplying materials, etc., and for cartage work. Particulars, etc., may be obtained on application at office of Mr. Reginald H. Jeffes, A.M.Inst.C.E., Engineer and Surveyor, Manor House, Cheshunt.

FEBRUARY 18.—**Stoke-upon-Trent.**—STORES.—The Corporation of Stoke-upon-Trent invite tenders for the supply of materials and goods. Particulars, etc., may be obtained upon application at office of Mr. A. Burton, A.M.Inst. C.E., etc., Borough Surveyor, Town Hall, Stoke-upon-Trent.

Auction Sales.

Nature and Place of Sale.	By whom Offered.	Date of Sale.
*DEALS, BATTENS, ETC.—Great Hall, Winchester House, Old Broad-street, E.C.	Churchill & Sims	Jan. 15
*FREEHOLD BUILDING SITE, BAYSWATER—At the Mart	Hampton & Sons	Jan. 20
*SCAFFOLDING AND TIMBER, ETC., BATTERSEA—103, Lavender Hill	J. Hibbard & Sons	do.
*STK. OF BRICK, LIME, AND CEMENT MERCHANT—At Lover's Whrf., Nine Elms-ln., S.W.	Clement B. Breed	Jan. 20, etc.
*SANITARY ENGINEER'S, ETC., STOCK—At Craven House, Kingsway, W.C.	J. T. Skelding	Feb. 4

PATENTS.—*Continued from page* 53.

28,131 of 1906.—H. SCHWARZ: *Wall or Masonry Elements.*

This relates to a building element for use in masonry, consisting of two or more parallel plates provided at their edges with projections at right angles to the plates, which projections are so formed that they may be secured to similar projections on the adjacent plates, the plates being connected together and secured at the desired distance apart by means of cylinders inserted between the plates with screw-bolts passing through the cylinders to secure the plates.

1,842 of 1907.—O. ROBINSON: *Parallel Vices.*

This relates to a parallel vice, wherein a half-nut is designed to be engaged with and disengaged from the screw, and consists of the combination with the said half-nut of a rod having a flattened portion which allows of the half-nut dropping out of the engagement with the screw, and the rotation of which serves to lift the said half-nut.

1,966 of 1907.—I. WICKES: *Closet Seat-guard.*

This relates to a closet seat-guard, consisting of a perforated paper roll having holes at suitable intervals, mounted on a roller fitted to the seat, and adapted to be brought over and secured to the seat in successive lengths.

8,035 of 1907.—S. A. VALENTINE: *Fire-protector for Domestic Fireplaces.*

This relates to a fire-protector for domestic fireplaces, consisting of a screen formed of a number of rods or wires arranged parallel with each other and connected at convenient distances apart by short lengths of chain, and provided with means of attachment to the front of the fireplace and the top edge of an ordinary fireguard.

9,072 of 1907.—E. H. NETHERCLIFT and G. IRVING & CO., LTD.: *Gas Pendants and Similar Gas Fittings.*

This relates to gas pendants and similar gas fittings, and consists in providing the fitting with a universal joint, consisting of two sets of flat friction-plates capable of moving round axles which are at right angles to each other, and are held in frictional contact by suitable springs. One of these joints is attached to the point of support, and the other is provided with a metallic tube which is shaped to form a guide for a sliding tube, which is held to the shaped tube by clips, and in its placed position by friction clips, screws, or the like. The upper end of the sliding tube is connected to the gas supply by a flexible tube, and the lower end is provided with an attachment for carrying the burner, which is connected to the lower end of the sliding tube by a flexible tube for the supply of gas.

TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom at the rate of 19s. per annum, and Canada 21s. 6d. (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, etc., 26s. per annum.

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MEETINGS.

FRIDAY, JANUARY 10.

Architectural Association.—Sir Chas. A. Nicholson, Bart., on "The Kingston Earthquake and Building in Jamaica." 7.30 p.m.

Institution of Civil Engineers (Students' Meeting).—Mr. H. Lapworth, D.Sc., on "The Principles of Engineering Geology." 8 p.m.

SATURDAY, JANUARY 11.

Junior Institution of Engineers.—Visit at 3 p.m. to the London County Council Tramway Reconstruction Work in South Lambeth-road, and Motor School; Car Sheds and Sub-Station at Clapham.

Builders' Foremen's Association.—Fourteenth annual dinner, King's Hall, Holborn Restaurant. 6.30 p.m.

MONDAY, JANUARY 13.

Surveyors' Institution.—Professor Henry Robinson on "Foreshore Erosion and Reclamation." 8 p.m.

London Institution.—Mr. Arthur R. Hinks on "The Evidence for Life on Mars," illustrated. 5 p.m.

London County Council School of Building (Ferndale-road, Clapham).—Professor Beresford Pite on "Timber-framed Houses and Roofs." 7.30 p.m.

University of London (South Kensington).—Mr. Banister Fletcher's introductory lecture on "English Gothic Architecture." 8 p.m.

TUESDAY, JANUARY 14.

Institution of Civil Engineers.—Papers to be further discussed:—(1) "Keyham Dockyard Extension," by Sir Whately Eliot, M.Inst.C.E.; (2) "Keyham Dockyard Extension: Temporary Works and Plant and Appliances Used in Construction," by Mr. G. Hall Scott, M.Inst.C.E. 8 p.m.

WEDNESDAY, JANUARY 15.

Edinburgh Architectural Association.—Mr. Birnie Rhind, R.S.A., on "Sculpture as Applied to Architecture." 8 p.m.

Builders' Foremen and Clerks of Works' Institution.—Annual meeting of the members. 8 p.m.

Architectural Association Discussion Section.—Mr. H. Rofe on "Water Supply for Country Houses." 7.30 p.m.

Northern Architectural Association.—Mr. M. Kahn on "Reinforced Concrete." 7.30 p.m.

Society of Arts.—Mr. C. E. Kenneth Mees, D.Sc., F.C.S., on "Screen-Plate Processes of Colour Photography." 8 p.m.

THURSDAY, JANUARY 16.

Royal Institution.—Professor W. W. Watts, M.A., on "The Building of Britain."—I. 3 p.m.

London Institution.—Mr. Isaac S. Scarf on "Flame," illustrated. 6 p.m.

Architectural Association Camera and Cycling Club.—Mr. Francis Bond, M.A., on "Parish Church Building in the Middle Ages." 7.30 p.m.

FRIDAY, JANUARY 17.

Glasgow Architectural Craftsmen's Society.—Mr. J. Scott on "Prosaic Discourse on Colour." 8 p.m.

Institution of Mechanical Engineers.—Professor Frederic W. Burstall on "Third Report to the Gas-Engine Research Committee." 8 p.m.

Institution of Civil Engineers (Students' Meeting).—Mr. H. Lapworth, D.Sc., on "The Principles of Engineering Geology." 8 p.m.

SATURDAY, JANUARY 18.

Royal Institution.—Professor Gisbert Kapp on "The Electrification of Railways."—I. 3 p.m.

TO CORRESPONDENTS.

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications; and the Editor cannot be responsible for drawings, photographs, manuscripts, or other documents, or for models or samples, sent to or left at this office, unless he has specially asked for them.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance. The Editor cannot undertake to read and consider articles offered for acceptance unless they are type-written.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£	s.	d.	
Hard Stocks	1	6	0	per 1000 alongside, in river.
Rough Stocks and Grizzles	1	5	0	" " "
Picked Stocks for Facings	2	10	0	" delivered,
Flettons	1	5	6	" at railway depôt.
Red Wire Cuts	1	14	0	" " "
Best Fareham Red	3	12	0	" " "
Best Red Pressed Ruabon Facing	5	0	0	" " "
Best Blue Pressed Staffordshire	3	15	0	" " "
Do. Bullnose	4	0	0	" " "
Best Stourbridge Fire Bricks	3	14	0	" " "
GLAZED BRICKS.				
Best White and Ivory Glazed Stretchers	12	0	0	" " "
Headers	11	0	0	" " "
Quoins, Bullnose, and Flats	16	0	0	" " "
Double Stretchers	19	0	0	" " "
Double Headers	16	0	0	" " "
One Side and two Ends	19	0	0	" " "
Two Sides and one End	20	0	0	" " "
Splays, Chamferred, Squints	20	0	0	" " "
Best Dipped Salt Glazed Stretchers, and Header	12	0	0	" " "
Quoins, Bullnose, and Flats	14	0	0	" " "
Double Stretchers	15	0	0	" " "
Double Headers	14	0	0	" " "
One Side and two Ends	15	0	0	" " "
Two Sides and one End	15	0	0	" " "
Splays, Chamferred, Squints	14	0	0	" " "
Second Quality White and Dipped Salt Glazed	2	0	0	" less than best.

	s.	d.	
Thames and Pit Sand	6	6	per yard, delivered.
Thames Ballast	5	0	" "
Best Portland Cement	30	0	per ton, "
Best Ground Blue Lias Lime	19	6	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 12s. 0d. per yard, delivered.
Stourbridge Fireclay in sacks 27s. 0d. per ton at rly. dpt.

STONE.

	s.	d.	
BATH STONE—delivered on road waggons, Paddington Depôt	1	6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt	1	8½	" "
PORTLAND STONE (20 ft. average)—			
Brown Whitbed, delivered on road waggons, Paddington Depôt, Nine Elms Depôt, or Pimlico Wharf	2	1	" "
White Basebed, delivered on road waggons, Paddington Depôt, Nine Elms Depôt, or Pimlico Wharf	2	2½	" "

	s.	d.	
Ancaster in blocks	1	10	per ft. cube, deld. rly. dep't.
Beer "	1	6	" "
Greenshill "	1	10	" "
Darley Dale in blocks	2	4	" "
Red Corsehill "	2	2	" "
Closeburn Red Freestone	2	0	" "
Red Mansfield "	2	4	" "
YORK STONE—*Robin Hood Quali*			
Scappled random blocks	2	10	" "
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2	3	per ft. super., "
6 in. rubbed two sides ditto, ditto	2	6	" "
3 in. sawn two sides slabs (random sizes)	0	11½	per ft. cube, "
2 in. to 2½ in. sawn one side slabs (random sizes)	0	7½	" "
1½ in. to 2 in. ditto, ditto	0	6	" "
HARD YORK—			
Scappled random blocks	3	0	"
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2	8	per ft. super. "
6 in. rubbed two sides ditto	3	0	" "
3 in. sawn two sides slabs (random sizes)	1	2	" "
2 in. self-faced random flags	0	5	" "

SLATES.

In.	In.	£	s.	d.	
20×10	best blue Bangor	13	2	6	per 1000 of 1200 at r. d.
20×12	" "	13	17	6	" "
20×10	first quality,	13	0	0	" "
20×12	" "	13	15	0	" "
16×8	" "	7	5	0	" "
20×10	best blue Portmadoc	12	12	6	" "
16×8	" "	6	12	6	" "
20×10	best Eureka unfading green	15	17	6	" "
20×12	" "	18	7	6	" "
18×10	" "	13	5	0	" "
16×8	" "	10	5	0	" "
20×10	permanent green	11	12	6	" "
18×10	" "	9	12	6	" "
16×8	" "	6	12	6	" "

TILES.

	s.	d.	
Best plain red roofing tiles	42	0	per 1000 at rly. depôt.
Hip and Valley tiles	3	7	per d z. "
Best Broseley tiles	50	0	per 1000 "
Do. Ornamental tiles	52	6	" "
Hip and Valley tiles	4	0	per doz. "
Best Ruabon red, brown, or brindled do. (Edwards)	57	6	per 1000 "
Do. Ornamental do.	60	0	" "
Hip tiles	4	0	per doz. "
Valley tiles	3	0	" "
Best Red or Mottled Staffordshire do. (Peakes)	51	9	per 1000 "
Do. Ornamental do.	54	6	" "
Hip tiles	4	1	per doz. "
Valley tiles	3	8	" "
Best "Rosemary" brand plain tiles	48	0	per 1000 "
Best Ornamental tiles	50	0	" "
Hip tiles	4	0	per doz. "
Valley tiles	3	8	" "
Best "Hartshill" brand plain tiles, sand-faced	50	0	per 1000 "
Do. pressed	47	6	" "
Do. Ornamental do.	50	0	" "
Hip tiles	4	0	per doz. "
Valley tiles	3	6	" "

WOOD.

BUILDING WOOD.	At per standard. £	s.	d.	£	s.	d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	13	10	0	... 15	0	0
Deals: best 3 by 9	13	0	0	... 14	0	0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11	0	0	... 12	0	0
Battens: best 2½ by 6 and 3 by 6	0	10	0	less than 7 in. and 8 in.		
Deals: seconds	1	0	0	less than best.		
Battens: seconds	0	10	0	" "		
2 in. by 4 in. and 2 in. by 6 in.	9	0	0	... 10	0	0
2 in. by 4½ in. and 2 in. by 5 in.	8	10	0	... 9	10	0
Foreign Sawn Boards—						
1 in. and 1¼ in. by 7 in.	0	10	0	more than battens.		
1 in.	1	0	0	"		
Fir timber: best middling quality or Memel (average specification)	At per load of 50 ft. 4	10	0	... 5	0	0
Seconds	4	0	0	... 4	10	0
Small timber (8 in. to 10 in.)	3	12	6	... 3	15	0
Small timber (6 in. to 8 in.)	3	0	0	... 3	10	0
Swedish balks	2	10	0	... 3	0	0
Pitch-pine timber (30 ft. average)	4	0	0	... 4	15	0

JOINERS' WOOD.	At per standard.					
White Sea: first yellow deals, 3 in. by 11 in.	24	0	0	... 25	0	0
3 in. by 9 in.	22	0	0	... 23	0	0
Battens, 2½ in. and 3 in. by 7 in.	16	10	0	... 18	0	0
Second yellow deals, 3 in. by 11 in.	18	10	0	... 20	0	0
" " 3 in. by 9 in.	17	10	0	... 19	0	0
Battens, 2½ in. and 3 in. by 7 in.	13	10	0	... 14	10	0
Third yellow deals, 3 in. by 11 in. and 9 in.	13	10	0	... 15	0	0
Battens, 2½ in. and 3 in. by 7 in.	11	0	0	... 12	0	0
Petersburg first yellow deals, 3 in. by 11 in.	21	0	0	... 22	10	0
Do. 3 in. by 9 in.	18	0	0	... 19	10	0
Battens	13	10	0	... 15	0	0

WOOD (*continued*).

	At per standard. £ s. d.	£ s. d.
JOINERS' WOOD (*continued*)—		
Petersburg Second yellow deals, 3in. by 11in.	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.	13 0 0	14 0 0
Do. 3 in. by 9 in.	12 10 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals, 3in. by 11 in.	13 10 0	14 10 0
" " 3 in. by 9 in.	12 10 0	13 10 0
" " battens	10 0 0	11 0 0
Pitch-pine: deals	18 0 0	21 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow pine—First, regular sizes	44 0 0	upwards.
Oddments	32 0 0	"
Seconds, regular sizes	33 0 0	"
Yellow Pine oddments	28 0 0	"
Kauri Pine—Planks, per ft. cube..	0 3 6	0 5 0
Danzig and Stettin Oak Logs—		
Large, per ft. cube	0 3 0	0 3 6
Small " "	0 2 6	0 2 9
Wainscot Oak Logs, per ft. cube..	0 5 6	0 6 0
Dry Wainscot Oak, par ft. sup. as inch	0 0 8½	0 0 9½
¾ in. do. do.	0 0 7	—
Dry Mahogany—Honduras, Tabasco, per ft. super. as inch	0 0 9	0 1 0
Selected, Figury, per ft. super. as inch	0 1 6	0 2 6
Dry Walnut, American, per ft. super. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	22 0 0
American Whitewood Planks, per ft. cube	0 4 0	0 5 0
Prepared Flooring, etc.—	Per square.	
1 in. by 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 0 0
1 in. by 7 in. white, planed and shot	0 12 0	0 14 6
1 in. by 7 in. white, planed and matched	0 12 6	0 15 0
1¼ in. by 7 in. white, planed and matched	0 15 0	0 16 6
¾ in. by 7 in. yellow, matched and beaded or V-jointed brds.	0 11 0	0 13 6
1 in. by 7 in. " "	0 14 0	0 18 0
¾ in. by 7 in. white " "	0 10 0	0 11 6
1 in. by 7 in. " "	0 12 9	0 15 0

6 in. at 6d. to 9d. per square less than 7 in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	7 15 0	8 5 0
Compound Girders, ordinary sections	10 0 0	11 0 0
Steel Compound Stanchions	12 10 0	13 10 0
Angles, Tees, and Channels, ordinary sections	9 15 0	10 15 0
Flitch Plates	9 15 0	10 15 0
Cast Iron Columns and Stanchions including ordinary patterns	8 0 0	9 0 0

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars	8 10 0	9 0 0
Staffordshire Crown Bars, good merchant quality	9 5 0	9 15 0
Staffordshire "Marked Bars"	11 0 0	—
Mild Steel Bars	9 10 0	9 15 0
Hoop Iron, basis price	9 15 0	10 0 0
" " Galvanised	17 10 0	—
("And upwards, according to size and gauge.)		
Sheet Iron Black—		
Ordinary sizes to 20 g.	10 0 0	—
" " 24 g.	11 0 0	—
" " 26 g.	12 10 0	—
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	16 0 0	—
Ordinary sizes to 22 g. and 24 g.	16 10 0	—
" " 26 g.	17 0 0	—
Sheet Iron, Galvanised, flat, best quality—		
Ordinary sizes to 20 g.	19 0 0	—
" " 22 g. and 24 g.	19 10 0	—
" " 26 g.	21 0 0	—
Galvanised Corrugated Sheets—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	16 0 0	—
" " 22 g. and 24 g.	16 5 0	—
" " 26 g.	17 10 0	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	13 0 0	—
Best Soft Steel Sheets, 22 g. & 24 g.	14 0 0	—
" " " 26 g.	16 0 0	—
Cut Nails, 3 in. to 6 in.	10 15 0	11 5 0
(Under 3 in., usual trade extras.)		

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3lb. and up.	17 10 0	—
Pipe in coils	18 0 0	—
Soil pipe	20 10 0	—
Compo pipe	21 10 0	—
ZINC—Sheet—		
Vieille Montague ton	29 0 0	—
Silesian	28 15 0	—
COPPER—		
Strong Sheet per lb.	0 1 2	—
Thin "	0 1 3	—
Copper nails "	0 1 1	—
BRASS—		
Strong Sheet "	0 1 0	—
Thin "	0 1 1	—
TIN—English Ingots "	0 1 5	—
SOLDER—Plumbers' "	0 0 8	—
Tinmen's "	0 0 10	—
Blowpipe "	0 1 0	—

ENGLISH SHEET GLASS IN CRATES OF STOCK SIZES.

15 oz. thirds	2½d. per ft. delivered.
" fourths	1½d. " "
21 oz. thirds	3½d. " "
" fourths	2½d. " "
26 oz thirds	4½d. " "
" fourths	3½d. " "
32 oz. thirds	5d. " "
" fourths	4½d. " "
Fluted Sheet, 15 oz.	3½d. " "
" 21 oz.	4½d. " "

ENGLISH ROLLED PLATE IN CRATES OF STOCK SIZES.

⅛ Hartley's	2½d. per ft. delivered.
¼ "	2½d. " "
¼ "	3d. " "
Figured and Oxford Rolled "Oceanic" Glass, white	4d. " "
Do. " tinted	5½d. " "

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes	per gallon	0 2 1
" " " in barrels	"	0 2 2
" " " in drums	"	0 2 3
Boiled " " in pipes	"	0 2 2
" " " in barrels	"	0 2 3
" " " in drums	"	0 2 4
Turpentine in barrels	"	0 3 0
" in drums	"	0 3 2
Genuine Ground English White Lead	per ton	26 0 0
Red Lead, Dry	"	25 0 0
Best Linseed Oil Putty	per cwt.	0 7 0
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 0
Berlin Black	0 16 0
Knotting	0 10 9
French and Brush Polish	0 10 6

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.* [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is stated, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

ANDOVER.—For repairing the town bridge, for the Borough Council. Mr. R. W. Knapp, Borough Surveyor, Town Hall, Andover:—

Town Bridge.

F. Beale & Sons	£26 10
H. A. Annett & Sons, West-street, Andover*	25 0

Charlton Bridge.

H. A. Annett & Sons	£22 10
F. Beale & Sons, Building Works, Andover*	20 10

BATH.—For extensions to Springfield Entry Hill, for Mr. G. E. Spear. Mr. W. H. Watkins, A.R.I.B.A., architect, 15, Clare-street, Bristol:—

Stephens, Bastow, & Co., Ltd.	£1,997	Chancellor & Sons	£1,800
Erwood & Morris	1,942	Hayward & Wooster	1,677
Wills & Sons	1,895	J. Long & Son, Ltd., Bath*	1,674
W. Webb	1,875		

BISHOP'S STORTFORD.—For extension of engine-house at waterworks, for the Urban District Council:—

E. F. Lawrence	£375 0	A. I. Mackwell, Bishop's Stortford*	£283 10
C. Martin	321 10		
J. Day	294 0		

BRISTOL.—For extensions to warehouse, for Messrs. J. W. Swaish & Co. Mr. W. H. Watkins, A.R.I.B.A., architect, 15, Clare-street, Bristol:—

C. Willcox	£310

BROADSTAIRS.—For proposed pair of villas, Knight's-avenue, Broadstairs, for Mr. G. A. Holmes. Mr. W. L. Dowton, architect, City Bank-chambers, 44, Theobald's-road, W.C.:—

Paramor & Sons	£1,380	E. G. Holbourn	£1,089
W. J. Adcock & Son	1,272	G. Miriams	1,025
E. Brown	1,157	T. Horne & Co.	965
J. T. May	1,144	W. W. Martin*	925
G. H. Denne	1,091		

BRYNMAWR.—For altering the course of the sewage conduit leading to the sewage farm, for the Urban District Council. Mr. H. B. Jones, Surveyor, Brynmawr:—

J. Monks & Co., Crumlin, *via* Newport	£91

CHATHAM.—For proposed pair of villas, Maidstone-road, Chatham, for Mrs. G. Hornsby. Mr. W. L. Dowton, architect, 44, Theobald's-road, W.C.:—

A. S. Ingleton	£1,370	H. E. Phillips	£1,175
G. E. Wallis & Sons, Ltd.	1,360	G. Baker & Sons	1,122
G. Gates & Sons	1,330	G. H. Denne & Son	1,107
J. Wood & Sons	1,328	C. E. Skinner	1,065
West Bros.	1,275	H. W. Rigden‡	925

‡ Recommended for acceptance.

CLIFTON (York).—For erecting two blocks for chronic cases at the North Riding Asylum, Clifton. Mr. G. H. Fowler Jones, architect, 8, Lendal, York:—

Rochester	£23,463	12 0
Davidson	17,886	3 3
Pattinson & Sons	17,820	0 0
Moss & Sons	17,725	0 0
Irwin & Co.	17,225	0 0
Murgatroyd & Son	16,750	0 0
T. Lumsden	16,500	0 0
T. Rawling	16,365	0 0
Wilson & Son	16,363	0 0
W. Birch	16,229	11 4
P. Rhodes	16,097	0 0
Arnold & Son	16,084	0 0
W. Bellerby	15,865	10 0
J. Pullan	15,690	0 0
W. Nicholson & Son, Leeds*	15,690	0 0

CORWEN.—For building boundary wall, erecting chapel, laying-out ground (about 1½ acres) at new cemetery, for the Parish Council:—

Evans Bros., Cynwyd, near Corwen*	£550 10 0

CRAMLINGTON.—For new cemetery works (Contract No. 2), for the Urban District Council. Mr. W. J. Coulson, Surveyor, Council Office, Cramlington. Quantities by Surveyor:—

W. Carr	£183	J. Coxon & Son, Seaton Delaval*	£147
W. T. Wallace	180	J. W. Shannon & Co.	142
M. McKinnon	171		
South Bank Slag and Tar Macadam Co.	153		

[Surveyor's estimate, £146.]

DEWSBURY.—For the reconstruction of Cut End Mills, Savile Town. Messrs. C. H. Marriott, Son, & Shaw, engineers, Church-street-chambers, Dewsbury:—

Mason: J. Horkin, Liversedge*	£587 1 11
Joiners: S. Armitage & Son, Batley Carr, Dewsbury*	618 15 7
Ironfounders: S. Armitage & Son, Batley Carr, Dewsbury*	335 4 2
Slater: W. R. Thompson, Dewsbury*	193 10 0
Plumber: W. N. Rodden, Savile Town*	86 5 10
Patent Glazing: Standard Patent Glazing Co., Dewsbury*	313 19 4
Painter: W. N. Rodden, Savile Town*	22 19 0

HAMMERSMITH.—For the erection of new factory, for the Wolfram (Tungsten) Metal Filaments Lamps, Ltd. Mr. Richard J. Lovell, architect, 46, Queen Victoria-street, E.C. Quantities by Mr. W. H. Webber, F.S.I., Q.S.A., 7, Great James-street, Bedford-row, W.C.:—

Hughes & Stirling	£41,688	Barnett & Brotchie	£37,010
E. H. Roome & Co.	39,686	Walkerdine	36,939
Wisdom Bros.	39,403	Waring-White Building Co.	35,978
Spencer, Santo, & Co., Ltd.	39,377	H. Lovatt, Ltd.	34,832
J. Allen & Sons	38,265	J. Carmichael	34,456
J. Chessum & Sons	37,892	J. McManus*	34,400
Trollope & Colls	37,587		

HULL.—For erecting new pavilion in the school playing-field, Hedon-road (Craven-street Secondary School), for the Education Committee:—

W. L. Harrison	£139 0 0	J. Simpson & Son	£102 1 0
Fewlass Bros.	135 16 6	R. Orwin	99 10 0
J. T. Dodds	133 9 8	J. Houlton & Son, Ltd.	90 0 0
H. T. Arnott	116 0 0	G. W. Berridge*	84 0 0
F. Singleton	105 0 0		
J. E. Railton	104 16 6		

[All of Hull.]

LONDON.—For the erection of a police section-house at Upper Rathbone-place, W. Mr. J. Dixon Butler, F.R.I.B.A., Surveyor to the Metropolitan Police, New Scotland Yard, S.W. Quantities by Messrs. Thurgood, Son, & Chidgey, 8, Adelphi-terrace, Strand, W.C.:—

A. & E. Lea	£5,971	Mowlem & Co., Ltd.	£5,493
Lovatt, Ltd.	5,956	Higgs & Hill, Ltd.	5,450
Lascelles & Co., Ltd.	5,550	W. Eyre	5,360
Lathey Bros.	5,547	Godson & Son	5,267
C. Ansell	5,500	F. & H. F. Higg	5,239
Holloway Bros., Ltd.	5,500	Grover & Son	5,083
Newby Bros.	5,500		

CHISWICK.—For private improvements, for Chiswick Urban District Council. Mr. E. Willis, Engineer and Surveyor, Town Hall, Chiswick, W.:—

—	Spencer-road. £ s. d.	Bolton-road. £ s. d.	Hartington-road. £ s. d.	Devonshire-gardens. £ s. d.	Burlington-lane. £ s. d.
T. Adams	202 0 0	209 0 0	273 0 0	112 0 0	476 0 0
T. Free & Sons	153 1 1	136 1 0	248 0 5	87 18 0	453 3 5
J. Mowlem & Co.	—	—	—	—	458 0 0
T. W. Pedrette	182 11 6	277 10 6	244 1 1	111 13 7	417 9 3
W. E. Rhodes	—	—	—	—	420 0 0
H. Boyer	183 0 0	175 0 0	251 0 0	103 0 0	359 0 0
H. Woodham & Sons	187 0 0	190 0 0	257 0 0	115 0 0	447 0 0
M. N. Rhodes	242 0 0	248 0 0	337 0 0	139 0 0	450 0 0

LONDON.—For Brunswick Hall, Whitechapel-road. Messrs. G. Baines & Son, architects, 5, Clement's-inn, Strand, London, W.C.:—

W. Gladding & Co.	£2,769	10	0
Hawkey & Oldman	2,579	0	0
H. J. Carter	2,461	0	0
F. & T. Thorne	2,401	0	0
Patman & Fotheringham	2,342	0	0
W. Lawrence & Son	£2,320	10	0
Turtle & Appleton	2,260	0	0
Rattley, Sons, & Holmes	2,195	0	0
Sands & Burley*	2,133	11	6

LONDON.—For forming banking premises at Nos. 84, 86, and 88, Great Eastern-street, Old-street, E.C., for the London and Provincial Bank, Ltd. Mr. V. Vagnolini, architect and surveyor, 33, Stirling-road, Clapham-rise, S.W.:—

W. Smith & Son	£1,860	H. Kent	£1,822
Rice & Son	1,844	J. Parsons*	1,679
A. Monk	1,825		

LONDON.—For excavating and forming road about 659 yds. long at Plumstead. Messrs. T. Dinwiddy & Sons, architects and surveyors, 54, Parliament-street, S.W., and Greenwich:—

Neave & Son	£1,027	0	
Killingback & Co.	1,015	0	
F. Saunders	999	13	
Miskin, Ltd.	995	0	
E. Yewen	969	0	
Kavanagh & Co.	947	0	
Edwards & Co.	819	0	
Fry Bros.	803	0	
J. E. Etheridge	795	0	
Tuff & Hoar	776	0	
Wilson, Border, & Co.	£730	0	
J. Jackson	717	0	
W. Pearce	693	0	
F. Bentham	685	0	
T. Adams	648	0	
J. C. Trueman, Ltd., Swanley Junction*	539	0	

LONDON.—For the reconstruction of the drainage system at the relief station, Elder-road, West Norwood, for Lambeth Board of Guardians:—

		Time for completion. Weeks.
W. Beattie	£121 12 0	3
B. W. Bennett & Son	110 0 0	6
W. Bickerton	96 10 0	5
H. Bragg & Sons, Ltd.	107 0 0	3
B. Bristow & Son	114 0 0	—
T. Brown & Son	95 10 0	4
S. J. Collins	115 0 0	5
Crabb & Son	98 0 0	5
F. Deacon & Son	115 0 0	—
B. & A. Gale	119 0 0	4
Hammond & Son, 139, High-street, West Norwood*	96 10 0	4
W. H. Hyde & Co.	138 0 0	9
A. H. Inns	95 0 0	6
F. W. Loasby	120 0 0	5
Pasterfield & English	112 0 0	6
J. Pennington	194 15 0	5
Potter & Co.	90 0 0	3
G. G. Rayner	108 15 0	4
Rowe & Co., Ltd.	99 10 0	4
F. J. Strutt & Co.	145 0 0	4
Wenham & Waters, Ltd.	91 0 0	4

RURGHEAD.—For additions to United Free Church. Messrs. Wilson & Walker, architects, Aberdeen. Quantities by architects:—

Mason Work: Miller Bros., Hopeman* ....
Carpenter Work: Burnett & Low, Aberdeen*
Slater Work: F. Morrison, jun., Aberdeen*. } £882 4 2
Plaster Work: Brodie & Son, Elgin* .....
Plumber Work: J. H. Clark, Elgin* .....
Painter Work: A. Ferguson & Co., Aberdeen*

TAUNTON.—For the construction of Laburnum-street, Priory, for the Town Council. Mr. D. Edwards, Borough Engineer and Surveyor, Municipal-buildings, Taunton:—

E. G. Coles	£350	2	9
F. Small	350	0	0
J. Y. Coles	£333	19	10
G. Pollard & Co.	322	14	4

[All of Taunton.]

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WESTMINSTER.—For new County Court:—

		Cr.
W. Willett	£11,096	£14
M. Pearson	10,890	5
C. Gray	10,655	20
Martin, Wells, & Co., Ltd.	10,599	—
Gaze & Sons	10,595	—
A. M. Coles	10,588	30
W. E. Blake	10,150	5
Cubitt & Co.	10,052	5
Jarman, Daws, & Co.	9,981	—
General Building Co.	9,990	12
Lorden & Son	9,944	11
Barker & Co., Ltd.	9,973	50
Patman & Fotheringham, Ltd.	9,889	—
J. C. Mather	9,855	25
Dearing & Son, Ltd.	9,812	—
Crossley & Son	9,800	30
C. Wall, Ltd.	9,702	10
Appleby & Sons	9,670	50
Holliday & Greenwood, Ltd.	9,622	10
R. Cook & Sons	9,579	11
Vigor & Co.	9,560	10
Holloway Bros., Ltd.	9,498	—
Perry & Co.	9,500	16
Galbraith Bros.	9,470	10
Spencer, Santo, & Co., Ltd.	9,440	—
J. & M. Patrick	9,439	—
Prestige & Co.	9,465	50
Ashby & Horner	9,411	5
Mc Cormick & Sons	9,360	5
B. E. Nightingale	9,279	—
Allen & Sons, Ltd.	9,265	6
Kingerlee & Sons	9,225	11
Cropley Bros., Ltd.	9,185	10
S. Salter	9,100	—
Dorey & Co., Ltd.	9,090	—
Waring White Building Co. Ltd.	8,988	10
S. Roberts, Ltd.	8,972	7
H. J. Williams, Ltd.	8,975	25
Higgs & Hill, Ltd.	8,934	50
Shepherd & Co.	8,847	50
F. E. Minter	8,786	—
Perry Bros.	9,777	1,000
Akers & Co., Ltd.	8,757	5
Grover & Son	8,744	22
Smith & Sons, Ltd.	8,683	7
Pattinson & Sons, Ltd.	8,671	—
F. & H. F. Higgs	8,654	30
Mowlem & Co.	8,598	20
Foster & Dicksee, Ltd.	8,645	150
Chessum & Sons	8,435	3
Leslie & Co., Ltd.	8,429	33

WEYMOUTH.—For erecting a bakery at Brownlow-street, for Weymouth and District Co-operative Society. Mr. S. Jackson, architect and surveyor, Bridge-chambers, Weymouth:—

F. Selby	£455	S. J. Smith	£398
S. Froom	430	Stone & King	365
Holmes & Co.	400	J. T. Wills, Weymouth*	345

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